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SEP 06 2001

SABRE SHEDS ITS MAINFRAME LEGACY

Massive switchover to Compaq servers may affect the entire airline industry

BY JENNIFER DISABATINO

In a massive technological undertaking that analysts said will change the way airlines do business, Sabre Holdings Corp. is shedding its decades-old mainframe-based system.

Sabre announced last week that over the next several years, it will move its airline registration database system to Compaq Computer Corp.'s NonStop Himalaya servers at a cost of $100 million.

"This is not a project for the weak and squeamish," said Henry Harteveldt, a senior analyst at Forrester Research Inc. in Cambridge, Mass. Sabre hosts the reservation systems for more than 50 airlines.

"What this represents is a recognition of the need to respond to the new e-commerce travel model," said analyst Richard Eastman at The Eastman Group Inc. in Newport Beach, Calif.

Fort Worth, Texas-based Sabre is moving off an IBM transaction-processing mainframe reservation system that has been the airline standard since the 1950s. In its place, Sabre will create an open system based on more modern programming and database technologies like C++, Java and SQL.

Sabre said it will take three to four years to move to a server environment, which will be

Sabre, page 57

INFORMIX USERS WEIGH IBM LOYALTY

Specter of DB2 looms as migration concern

BY DAN VERTON
SOMERS, N.Y.

One month after completing the acquisition of Informix Corp.'s database business, IBM executives pledged to continue support for Informix products. That has some users breathing a sigh of relief, but others aren't so confident about IBM's long-term commitment.

Informix Users, page 15

Version Control

Upcoming Informix releases:

- IBM/Informix Dynamic Server (IDS) v9.2: Due Oct. 1; will include enhanced performance and usability as well as DB2 Connect for linking to DB2
- IDS v9.4: In development; commitment made for v9.5
- XPS: Due by the end of this year or early next year
- Red Brick v6.2: Expected in the first quarter of 2002

RADICAL MOVE: STATES TRY TAX OUTSOURCING

BY PATRICK THIBODEAU
WASHINGTON

A small group of companies is participating in a project to outsource sales tax collections. State government backers of the project hope it will revolutionize the way sales taxes are collected and paid.

Taxware International Inc. in Salem, Mass., and subcontractor Hewlett-Packard Co. have developed a transaction server that interfaces with a merchant's retail system via an Internet connection to automate tax calculation at the time of sale. The system was expected to go live late last week.

What makes this project groundbreaking is the agreement by participating states to test and then certify the accuracy of the vendor's software, as well as shift some of the potential routine tax audit liability — a major burden for businesses — to the outsourcing vendor.

The pilot project is intended to show two things: first, "that

Taxes, page 15

THE Party's Over

Kiss staggering salaries goodbye!

Computerworld's 15th Annual Salary Survey reveals that economic reality has hit IT hard this year. Managers are expecting more from workers, are doling out less pay to new hires, have reined in salary increases for veteran workers and have all but eliminated bonuses.

See "More for the Money" on page 26

WHAT THEY EARN

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Nothing could be further from the truth. In times of economic downturn, it may seem prudent to put the whole e-Business issue on the backburner. But it's not. Tough times call for speed, nimbleness and agility more than ever. The time to get smart and implement e-Business solutions for your customers is today.

THE INTERNET CHANGES EVERYTHING.

The Internet does not change everything. It doesn't change the business rules that run your company. Or the infrastructure you've spent years building. Or the nature of your business. Or your need to generate revenues and profit.

The Internet is obviously a critical part of any e-Business. But the Internet is only a common set of protocols for the transport of information. It's how well you manage that information that determines the success of your business.

IT'S A ONE-BRAND WORLD.

This myth surrounds just about every significant e-Business platform discussion. Virtually every purveyor of e-Business platforms touts their version of this "one-brand" world. Their brand, of course. Big surprise.

At Sybase, we know it's just not true. Countless brands compete, cooperate and commingle inside your company. It's laughable to pretend that any one external organization can "standardize" all the various protocols, systems, components, new technologies, languages, databases and vendor relationships that your business depends on to succeed.

Our open e-Business platform embraces diversity. Making all of this stuff work together is what our stuff is all about.

A WEBSITE IS A PORTAL. A PORTAL IS AN e-BUSINESS.

Well, not quite. A website is not a portal. And even if it was, a portal is not an e-Business.

Portals and websites along with application servers, databases, customer relationship programs, automated supply chains, an efficiently connected field force and the rest of your back office are all vital components of an e-Business. It's making them work together that's the trick.

Unless data has the ability to travel from a customer's pager to your trusty S390 mainframe and then back to your customer via cell phone, you may very well have a website, but you really don't have an e-Business.

Our proven e-Business platform totally delivers this end-to-end functionality. It integrates every single aspect of your business. What's more, it has the scalability to constantly integrate your new components into the mix. Like say, 10,000 brand new customers, for example. Or a new CRM app.

Just something to think about when people offer you buzzwords instead of technologies.

IF AT FIRST YOU DON'T SUCCEED, THROW SOME MORE MONEY AT IT.

Hah. Very funny. But still a popular belief for a long time. Listen: It's all pure poppycock. The real e-Business solutions deliver real-life business results. By that we mean increased revenues, reduced costs and profit to your bottom line.

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JUST BECAUSE IT DOESN'T HAVE A CORD
DOESN'T MEAN IT SHOULDN'T BE PLUGGED IN.
MOTOROLA
depends

CONTRACTOR DEALS

With the economic downturn, IT managers are getting better deals than ever before from in-house consultants and third-party contractors. **PAGE 36**

WARNING FLAGS

The Internet is one major attack away from disaster, says security expert Stephen Northcutt. **PAGE 44**

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QuickLink For breaking news, updated twice daily at noon and 5 p.m., visit the *Computerworld.com* Web site.
www.computerworld.com/q?q4000

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38 Career Adviser: Fran Quittel offers advice on how to market yourself as a Java programmer.

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48 QuickStudy: Spooling a computer document or file allows you to process it at a more convenient time. Find out more in this week's primer.

50 Security Journal: Ensuring security at outsourced service providers can become a legal exercise, security manager Vince Tuesday discovers as he attempts to outsource the corporate Web site.

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22 Patricia Keefe says the industry needs to stop scapegoating the dot-com crash, get back to work and focus on the hallmarks of old-fashioned business success.

22 Pimm Fox writes that when layoffs are near, automated tools and good communication can reduce the risk of internal computer attacks.

23 David Foote claims that despite the economic swoon, IT professionals continue to pull down decent money.

58 Frank Hayes says there are seven "laws" whose true meanings many IT professionals don't understand.

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ONLINE

IT SALARIES

What do you think about the state of IT salaries? Post your thoughts in our online discussion forum.
www.computerworld.com/salaryforum

ROUTE TO MOBILE COMPUTING

Andrew Bovingdon, director of product marketing at Tarantella Inc., outlines a way to connect mobile users to nonmobile systems — all with the comfort of knowing you have a secure system.
www.computerworld.com/wireless

SHOW ALL YOU CAN

3-D Web technologies can bring depth to online storefronts, writes SolidWorks Corp.'s Tim Trainer. Go to our E-Commerce Community to read the case for using them and get some implementation tips.
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AT DEADLINE

DOJ Counters Microsoft Plea

The U.S. Department of Justice filed court papers last week opposing Microsoft Corp.'s effort to get the Supreme Court to throw out its antitrust case based on Judge Thomas Penfield Jackson's out-of-court comments critical of the company. Microsoft claimed those comments warrant retroactive disqualification. However, the DOJ pointed out that the U.S. Court of Appeals affirmed findings that Microsoft acted illegally to maintain its monopoly and limited its disqualification of Jackson.

Sabre, Lufthansa Team Up for Cargo

Fort Worth, Texas-based Sabre Holdings Corp. and the German airline Deutsche Lufthansa AG have formed a multimillion-dollar partnership to create a cargo revenue-management system. The system will estimate the capacity of departing flights and determine the most profitable allocation of space for the cargo.

Cisco Releases New Version of Unity

Cisco Systems Inc. last week announced release of Unity 3.0, an upgrade to the network company's unified message system, which now scales to 100,000 users and adds native support for Microsoft's Exchange 2000. Users with Cisco IP telephones will be able to check their Exchange e-mail via their phones' digital displays.

PeopleSoft Unveils Automation Apps

Pleasanton, Calif.-based PeopleSoft Inc. announced the rollout of a suite of enterprise service automation applications to help companies procure and manage contract and temporary labor, as well as in-house service personnel.

PeopleSoft 8 Creates Challenges for Users

Customers like product's Web-enabled collaborative features, but see obstacles

BY MARC L. SONDINI
ATLANTA

USERS HAVE hit a few bumps in the road as they install the new version of PeopleSoft Inc.'s business software.

Last week at Connect 2001, the Pleasanton, Calif.-based software company's annual North American user conference here, some attendees said they have had problems with service and support during upgrades and implementations. And because Versioo 8 is completely Web-enabled, those who use it might require extensive retraining.

In addition, users will need to reassess their existing server infrastructures to determine whether they need to add more Web servers to handle the additional load, in part because the product's predecessor was client/server-based.

PeopleSoft executives said they are pleased with the migration numbers, adding that there have been no major complaints from the approximately 200 customers that have installed the upgrade. The company also said it offers special service packages to assist users in a rapid implementation.

Analysts differed on how well PeopleSoft has done in migrating its users to Versioo 8. For instance, a recent report by Boston-based AMR Research Inc. claimed that PeopleSoft needs to upgrade more of its customers to Version 8 — including 1,000 that started using PeopleSoft when the company acquired customer relationship management company Vantive Corp. in 1999.

Other analysts said PeopleSoft has fared well in comparison with SAP AG and Oracle Corp., which also released next-generation Web-based business applications this year.

Analysts also had mixed opinions about the complexity of Version 8.

Slow to Move

PeopleSoft's migration numbers, according to CEO Craig Conway:

The software itself scored high marks from Alister Sutherland, an analyst at Toronto-based IDC Canada. "They're the only ones to have developed a real marketable 100% Internet solution ready for the market," he said.

The challenge for upgrading will depend on the type and size of users' IT environments, according to Sutherland.

When Kaiser-Hill Co. did a fast-track upgrade this past year from PeopleSoft 6 to PeopleSoft 8 financial and human resource applications, it found qualified support staffers very difficult to find, along with the necessary server configuration and software installation instructions, said Vick Bogenberger, Kaiser-Hill's controller.

Compounding its problems, the Golden, Colo.-based environmental services firm decided to replace its public sector version of PeopleSoft with the private business commercial version. At the time, PeopleSoft didn't support that kind of upgrade.

On top of that, wheo Kaiser-Hill started migrating in January, patches were frequently being released, hardware and software recommendations were a moving target, system performance benchmarking results were unavailable and qualified consultants required a two-month lead time and were expensive to hire.

"Consultants are in demand," Bogenberger said. "If you want that kind of support, ask for it early." Kaiser-Hill started going live with the upgrade in May.

Ease Users' Workload

PeopleSoft should proactively deliver patches and fixes rather than make IT staff look for them at its Web site, said Vijay Verma, CIO at the University of Maryland University College in Adelphi, Md.

The school recently upgraded from Version 7 of PeopleSoft's human resources application to Version 8 to run its distributed worldwide campus via the Web. In a multimillion-dollar implementation, the college plans to to replace homegrown software with PeopleSoft's financial and student administration applications in the next few years.

During upgrades, it would help if PeopleSoft would e-mail fixes or "every quarter send a CD with all the patches together," said Verma.

Quick Link For additional resources online, visit our CRM Knowledge Center.
www.computerworld.com/q/?id2000

New Virus Targets, Encrypts .Exe Files

Attack operates in guise of Microsoft

BY JENNIFER DiSABATINO

Antivirus vendor Central Command Inc. has detected a new worm that, disguised as a warning from Microsoft Corp., mass-mails itself to users and once launched from an attachment, encrypts executable files, rendering them unusable.

The Medina, Ohio-based security company rates the virus as a medium risk and said that so far, there has been only one report of an infection. The worm, Win32.Invalid.A@mm, can infect computers running Windows 9x, NT and 2000.

Even so, Ryan Russell, an analyst at business security firm SecurityFocus.com Inc. in San Mateo, Calif., said the virus does pose a threat. "I think it's just early in the cycle," he said.

According to the announcement from Central Command, "The new worm named Win32.Invalid.A@mm carries a destructive payload that can render executable (.exe) applications unusable by encrypting them with a random encryption key."

The worm-embedded e-mail has a false From field indicating that it's from support@microsoft.com. It directs the user to download a patch to prevent buffer overruns in Internet Explorer from invalid Secure Sockets Layer (SSL) certificates.

"The SSL protocol is used by many companies that require credit card or personal information, so there is a high possibility that you have this certificate installed," the bogus e-mail says. "To avoid being attacked by hackers, please download and install the attached patch. It is strongly recommended to install it because almost all users have this certificate installed without their knowledge."

Studies Show Demand Stays Strong for IT Staffers, but Salary Growth Slows

Employers focus on enhanced benefits, including training, flextime, telecommuting

BY LINDA ROSENCRANCE

Labor Day found IT workers in a field where demand remains strong despite the sluggish economy. But that demand may not translate into higher salaries this year.

To compete for skilled IT workers, employers aren't necessarily offering higher salaries. Instead, they're pushing other benefits, such as flexible hours, training and telecommuting choices, to attract and retain employees, according to a Cutter Consortium survey of 47 Fortune 1,000 companies.

"The fact that companies are having trouble keeping up with market salaries means that salaries are rising more rapidly than expected," said Chris Pickering, a consultant at Arlington, Mass.-based Cutter and author of the report, "Survey of E-Business and IT Practices."

"This means that there is greater demand for IT staff than there is supply," Pickering added.

To attract the best IT people, companies are allowing workers to telecommute and training them on technologies that will lead to work on cutting-edge projects.

Pickering noted that the decision by companies to focus on nonsalary benefits supports one or both of the following claims: that IT professionals are more concerned about working conditions and advancing their technical expertise, and that companies have gone as far as they are willing to go in terms of salary, signaling a leveling off or decline in salary increases.

Modest Raises

Meanwhile, *Computerworld*'s 15th Annual Salary Survey shows that IT salaries are rising moderately this year, averaging just under 6%, which is still higher than the 4% raise the average U.S. worker can expect (see "More for the Money," page 26).

A study released in April by the Information Technology Association of America (ITAA), an Arlington, Va.-based trade group, also supports the view that demand for IT workers remains substantial, although not as strong as demand a year ago.

The ITAA report titled "When Can You Start?" concluded that demand for IT workers is strong despite a 44% drop from last year. Based on telephone interviews with 685 hiring managers, the report said employers will try to fill more than 900,000 new IT jobs this year but that 425,000 of those jobs will remain vacant. Last year, the ITAA said there were 850,000 openings for IT workers.

According to the group, the jobs most in demand by IT and non-IT companies through the first quarter of next year will

continue to be in the area of technical support, although demand for technical support professionals is down 65% from last year. The ITAA added that although the slowdown in the economy has diminished IT spending, demand for IT professionals with certain skills persists.

Pickering said the glut of former dot-com workers has led to a "mismatch" of skills between employers and potential employees. According to Chicago-based outplacement firm Challenger, Gray & Christmas Inc., 87,795 dot-com workers have been laid off since January.

"Java programmers are not in top demand now," Pickering said. "Because companies are concerned with integrating legacy systems with e-business systems, [people] with cross-application integration skills [are in demand]."

Shuman Lee, director of analytics at online recruiting firm Techies.com Inc. in Bloomington, Minn., agreed that the demand for qualified IT professionals outweighs the supply.

"[Companies] can't get enough [IT] people. The technology field is just growing too rapidly," Lee said. "And [prospective employees] are getting more attractive packages."

Lee said some of the best-paying fields in IT are systems administration, where the average salary for a worker with 10 years of experience is $78,400, nearly 72% more than the average starting salary for that job title; project management, where employees can expect to earn about $47,400 to start and $93,600 after 10 years; and technology management, where 10-year veterans earn about $97,400, about twice the $48,600 starting salary.

New Judge, European Charges, Deepen Microsoft's Woes

BY PATRICK THIBODEAU
WASHINGTON

Microsoft Corp. faces increased antitrust woes, with a new district court judge thought by some to be open to the government's case, in addition to increased legal pressure last week from the European Commission for tying applications in Windows XP.

The U.S. District Court randomly assigned Judge Colleen Kollar-Kotelly to the historic case, replacing Judge Thomas Penfield Jackson — whose order to split the company in two was overturned by the U.S. Court of Appeals.

Observers said Kollar-Kotelly's appointment is a potentially positive sign for the government because she was appointed by the Clinton administration, which launched the case against Microsoft. But this case hasn't followed any political boundaries: Jackson, who was appointed during the Reagan presidency, is considered conservative, as are many members of the appeals court, which sent the case back to the district court for a remedy.

Kollar-Kotelly is a former federal prosecutor, and "she is used to dealing with malfeasance and will probably view the government case with less skepticism," said Dana Hayter, an attorney at Fenwick & West LLP in Palo Alto, Calif.

The government filed a motion last week requesting an expedited hearing. Kollar-Kotelly scheduled a meeting with both sides on Sept. 21.

The European Commission, which has been pursuing its case since 1998, last week charged that Microsoft illegally tied its Media Player to Windows and restated objections that Microsoft leveraged its operating system strength into the file- and print-server market.

In a statement, Microsoft said the new issues are "limited in scope" and won't have any impact on the pending release of Windows.

The European case could force Microsoft to offer slightly different versions of its products in Europe. Microsoft "could comply with the law in Europe and still sell a different version or engage in a slightly different practice in the U.S.," said Herb Hovenkamp, an antitrust expert and law professor at the University of Iowa in Iowa City.

European Commission involvement in the U.S. software industry isn't new. In 1982, after the U.S. dropped its antitrust case against IBM after a 13-year battle, European authorities continued their case, reaching a voluntary agreement in 1984 that changed some of IBM's business practices.

Kollar-Kotelly's main job will be to determine a remedy, a task assigned to her when the appeals court remanded the case back to the lower court last month.

And as far as choosing a remedy goes, Kollar-Kotelly's lack of antitrust experience may not matter. "Nobody has a lot of background in crafting remedies against a monopolist," said Donald Falk, an antitrust expert at law firm Mayer, Brown & Platt in Palo Alto, Calif.

The IDG News Service contributed to this report.

JUST THE FACTS

Legal Update

THE EC'S OBJECTION: Media Player's integration with Windows may be illegal.

U.S. COURT VIEW: The U.S. Court of Appeals left the tying issue undecided. It wants the lower court to re-examine the issue with an eye toward the consumer benefits of integration.

WHAT'S NEXT: A new U.S. judge will meet Sept. 21 with both sides to set a schedule. Microsoft has two months to respond to the new European objections.

Quick Link: For full coverage of Microsoft's legal battles, visit our Web site. www.computerworld.com/q/hi100

Schools Deploy Big Pipes as Internet Usage Skyrockets

Also tap unlicensed wireless and cable systems to cut costs, increase reliability

BY BOB BREWIN AND JAMES COPE

EXPLOSIVE GROWTH in studeot Internet usage over the past two years has resulted in school systems beefing np their networks to the point where they rival or exceed the capacity of many corporate networks.

In doing so, school systems around the country have deployed unlicensed wireless networks, tapped the bandwidth of cable television systems and even employed satellite service as a cheaper and more reliable alternative to local telephone companies.

The San Diego County Office of Educatioo has experienced 10% growth in Internet use by students in the county's 400 schools every month during the school year since 1999, said Chris Brawner, director of network and video services.

To handle that growth, he said, the county has beefed up its backbone service to school district offices from two DS-3 (45M bit/sec.) circuits last year to six OC-3 (155M bit/sec.) circuits, with individual schools served by a T1 (1.54M bit/sec.) link to that backbone.

The Pacific Bell unit of San Antonio-based SBC Communications Inc. is supplying four of the OC-3 circuits for backup, Brawner said. The Cox Business Services unit of Cox Communications Inc. in Atlanta is supplying another two.

Last year, Pacific Bell had an outage on its advanced services network that knocked out Internet service for two weeks, Brawner explained. To provide redundancy, he ordered the two OC-3s from Cox, which piggybacks on the cable TV operation installed in the county by another Cox division, Cox Cable.

A Maxed-Out T1

Rural Allegheny County in Maryland has seen Internet usage quadruple during the past several years, according to Jeff Blank, the county's supervisor of networking and microcomputing. That growth in usage "maxed out" the county's T1 Internet connection from Verizon Communications in New York, Blank said.

> A T1 connecting a school in one part of the state can cost no more than a T1 connecting a school in another part of the state.
>
> BILL SHAFER, EXECUTIVE DIRECTOR, OKLAHOMA ONENET

The county initially planned to install a DS-3 Internet connection for the start of this school year. But wheo Verizon quoted a monthly rate of approximately $18,000 for the DS-3 connection, Blank said, the county decided to instead install a 65-mile, six-hop, unlicensed wireless link operating in the 2.4-GHz band from its hub in Cumberland to a public Internet access point in Hagerstown. The fixed cost for that link was $130,000.

That long-distance link is the last step in a totally wireless network that serves 80 buildings in the 462-mile county — including 23 schools — via a 10M bit/sec. backbone with links to each school in the 3M bit/sec. range.

Blank said the fixed cost of the entire network — including the long-distance Hagerstown link — was about $350,000, vs. the $70,000 per month the county would have had to pay Verizon for similar service.

The state of Oklahoma has completed installation of a statewide network that provides connections of at least T1 speeds to schools over a backbone that runs at DS-3 or higher, according to Bill Shafer, executive director for the Oklahoma OneNet project.

While Oklahoma tapped the local phone company — the Southwestern Bell division of SBC Communications — for some of its links, the state also brought in a number of other service providers, including Williams Communications LLC in Tulsa, Okla., Sprint Corp. and Pioneer Telephone Cooperative in Kingfisher, Okla.

Shafer said these companies agreed to charge no more than $400 per month for a T1 connection to be used exclusively for data, compared with the approximately $1,000 per month Allegheny County paid last year for its T1 Internet connection. The state pays $750 per month for a circuit that also supports videoconferencing.

Call of the Wild

Remote Alaskan schools don't have the luxury of choosing from multiple wire-line service providers, so the University of Alaska has started to deploy a VSAT satellite service from McLean, Va.-based StarBand Communications Inc. to 25 communities throughout the state.

The initial deployment is designed to test speed and latency, as well as the toll the harsh Alaskan climate takes on performance, said Michael Sfraga, director of special programs at the University of Alaska at Fairbanks.

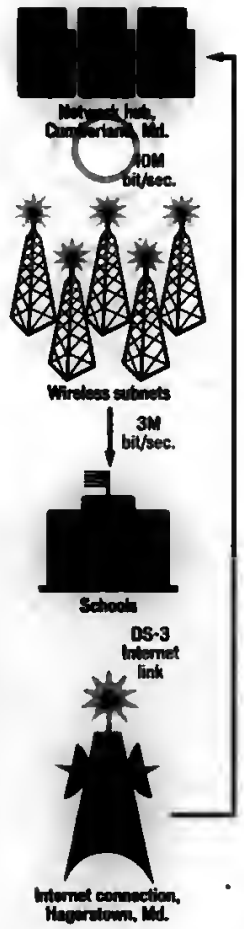
StarBand said it expects downstream rates to average 300K bit/sec. to 400K bit/sec., with upstream speeds running at about 60K bit/sec. While that may seem slow, Sfraga said he's optimistic about the boost in throughput the satellite system can deliver.

"There are places in Alaska where you can click Enter and go get a cup of coffee while the file downloads," he said. ■

BRAVING THE ELEMENTS: Huskies deliver a StarBand satellite dish to a remote area in Alaska.

Totally Wireless

Allegheny County in Maryland operates a totally wireless network to serve its 23 schools, including a 65-mile-long, 45M bit/sec. Internet connection to Hagerstown, Md.



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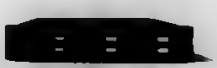

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Microsoft

DNA Research Algorithms May Break Up WAN Congestion

Beta testers report major cuts in traffic loads

BY JAMES COPE

NEW TECHNOLOGY was released last week that some users and analysts said is a breakthrough that could help solve congestion problems across wide-area networks.

Peribit Networks Inc. in Santa Clara, Calif., introduced molecular sequence reductioo (MSR) technology, which is based on pattern-recognition algorithms that have been used to study DNA. Peribit's MSR software spots repetitive patterns in data packets and assigns labels to those patterns.

Substituting the labels for repeating data packets can reduce overall WAN traffic loads by as much as 70% to 90%, said Amit Singh, Peribit's co-founder and chief scientist, who developed MSR.

"If I have 'Summertime is my favorite time of the year' in a PowerPoint slide, and that same term is repeated in an Excel spreadsheet or a database file, MSR recognizes the packet pattern that equates to that information and applies a label," Singh explained.

Similar Approaches

Shawn Farschi, CIO at Redwood City, Calif.-based BroadVision Inc., has been beta-testing Peribit's Model SR-50, the company's first MSR-based product, whicb was introduced last week.

"I'm seeing somewhere around 60% improvement on bandwidth [across the WAN]," said Farschi, who runs Oracle financial and human resources applications over his company's frame-relay network.

But Gil Hennoo, a member of The Memphis PC Users Group Inc. who teaches a course on data compression, questioned whether Peribit's technology is all that different from other data-compression schemes, such as those used to create ZIP and LZP files.

"MSR is pretty much the same process used in data-file compression, where a token is inserted wherever there are repetitive strings of data," Hennon said. "When uncompressed, the tokens are expanded back into the original strings."

Singh acknowledged that MSR takes an approach similar to the token-based method used by file-compression schemes for replacing repetitive strings. But, he said, file compression works within a defined range of a certain number of bytes of information, whereas Peribit's algorithms scour WAN packet streams over time without such a restriction. MSR finds far more repeating patterns and does so in real time, and it eliminates the file packing and unpacking associated with traditional compression, Singh said.

> [MSR] doesn't care whether it's a file or a packet. All it cares about is spotting common patterns.
>
> MICHAEL HOWARD, PRESIDENT, INFONETICS RESEARCH

The SR-50 system comes in a rack-mountable unit with the software installed. Pricing starts at $20,000.

Farschi said the SR-50 could pay for itself within six to 12 months by slowing the need to add more leased circuits as bandwidth demand increases.

Michael Howard, president of Infonetics Researcb Inc. in San Jose, said he thinks that the MSR technology represents a real breakthrough. "[MSR] doesn't care whether it's a file or a packet," he said. "All it cares about is spotting common patterns."

Matt Kesner, chief technical officer at law firm Fenwick & West LLP in Palo Alto, Calif., said his tests on an SR-50 beta unit have cut bandwidth demands on two of the firm's WAN links by 62% to 93%. Although Peribit is a client of Fenwick & West, Kesner said he isn't playing favorites.

"This is the only product from a client we've been willing to touch this year," Kesner said.

Brick-and-Click Bank Sites Outpacing Online-Only Banks

Real-world presence needed, says report

BY LUCAS MEARIAN

Brick-and-mortar banks' Web sites saw a far greater increase in use during the past year than did online-only banks, according to a report released last week that predicts the demise of Internet banks that don't embrace a particular niche audience or build physical locations.

Analysts have said for more than a year that online banks must offer either branch offices or automated teller machine (ATM) kiosks if they intend to survive. A report from New York-based Jupiter Media Metrix Inc. that examined Web traffic for each of the country's leading online and traditional bank sites in July 2000 and July 2001 seems to back those assertions.

Visits to tbe Web sites of banks that offer both physical locations and online services rose from 6.4 million in July 2000 to 13.4 million in July 2001, a 110.5% increase. Traffic at online-only banks fell 8.1%, from 1.2 million unique visitors to 1.1 million, during the same period, Jupiter reported.

The report also showed that online traffic at all bank sites grew 77.6% between July 2000 and July 2001, compared with an 18.9% overall rise in traffic.

Survival Skills

James Van Dyke, research director at Jupiter, said the new data confirms that online banks must begin to offer "physical distribution or audience specialization to survive" and suggested that traditional banks are now reaping the benefits of greater consumer comfort with online banking.

"Consumer surveys show that too many people value things like physical access to money, customer service and how long a bank has been in service," Van Dyke said.

In April, TowerGroup released a study that showed that although the Internet has reached critical mass among U.S. consumers, the traditional bank branch remains the primary source for delivery of financial services. Only 17% of households bank online, according to the Needham, Mass.-based market researcher.

According to Jupiter, New York-based The Chase Manhattan Corp.'s Chase.com was the most visited multichannel bank in July 2001. It also posted the largest year-over-year gain, with a 281.1% increase in unique visitors, up from 957,000 in July 2000 to 3.6 million in July 2001. Wells Fargo & Co. in San Francisco and Citibank in New York rounded out the top three most-trafficked multichannel banks in July 2001; each site drew about 3.5 million unique visitors.

Charging Ahead

Van Dyke attributed Chase's popularity to the success of its online credit card advertising on other Web sites rather than to customers logging in to conduct banking online.

Of the top four online-only banks, only Alpharetta, Ga.-based NetBank Inc. has reported consecutive quarterly profits, according to Van Dyke. It purchased ATMs along with Clearwater, Fla.-based Market Street Mortgage Corp. so it could create physical locations.

WingspanBank.com was folded into Bank One Corp. earlier this year, ETrade Group Inc. saw a significant drop in volume during the past year, and Juniper Financial Corp. has seen no movement in Web site use since the middle of last year, according to Van Dyke.

"Online banking has moved from being a competitive edge to a commodity," he said.

Van Dyke pointed to the G & L Bank in Pensacola, Fla., whicb serves gay and lesbian clients, as an institution that has successfully taken advantage of a niche audience to turn a profit.

"Gay couples can't get married in most states, so when they want to take out a loan, their assets aren't treated as pooled," he said. "[Traditional] banks aren't used to that audience's needs."

Economy's Losses Could Mean Gains for Linux Market

Lower cost drawing corporate IT's notice

BY TODD R. WEISS
SAN FRANCISCO

What effects could outside forces, including the sluggish U.S. economy and costly software licensing changes proposed by Microsoft Corp., have on the future of Linux?

At the LinuxWorld Conference & Expo here last week, users said they're watching those issues carefully to see how their companies could be affected by myriad behind-the-scenes developments.

Some users said the ongoing economic doldrums could be a boon to a wider deployment of low-cost or free Linux operating systems, at the expense of the dominaot Microsoft Windows. Others, however, said traditional corporate IT mantras will continue to emphasize Windows over other options — even those that might save companies money.

Even more influential than the economic downturn, said users, is a Linux corporate computing boom that could be fueled by Microsoft's costly new licensing models for the upcoming Windows XP operating system. Those changes could prompt established Microsoft customers to look for cheaper and less-restrictive alternatives.

Sherman Boyd, a systems administrator at computer manufacturer CLH International Inc. in Tempe, Ariz., said he's hearing more questions from corporate IT leaders about the Linux operating system and what it might offer to their businesses.

"Their ears are open now," Boyd said. "They do listen, and they are evaluating it."

Smaller companies could feel more of an impact from Microsoft's XP licensing plan, which prevents users from installing a single copy of the operating system on more than one machine, Boyd said.

Even though the practice is illegal, many small companies continue to buy just one copy of Windows and install it on all of their machines to save money. If they try to move to the more feature-rich Windows XP, that strategy will no longer be possible, Boyd explained.

That's where Linux could come in, he said.

"I can see Linux coming to the desktop for those people who can't afford [Windows]," Boyd said. "As people are forced to be honest, they may look at a solutioo that may not be as polished as they like, but at least it's free."

USERS AT LINUXWORLD said Microsoft's controversial new licensing models could lead to more companies turning to open-source software.

David Faries, president and CEO of NeuralTech Business Information Inc., an information research firm in Bainbridge Island, Wash., said he sees the potential for Linux to gain traction in business because of the savings it can bring to companies. "It will get down to economics," he said.

But Stephen Hahn, vice president of research and development at Computing Energy Inc., a consultancy in Alameda, Calif., said that none of his clients has shown an interest in switching to Linux to save IT dollars.

"For them, relationships are important" when dealing with major vendors such as IBM, Oracle Corp. and others, he said. And because Fortune 500 user companies tend to have long procurement cycles, they are less affected by cyclical downturns in the economy, Hahn said.

"They're not going to shift technologies radically" because of their inherent fears that they would then lack skilled staff to run the new systems, he said. "You bring in another system, and you have to bring in more people," he added.

Even so, Jay Crafton, a PC specialist at Group Athletica LLC in Indianapolis, a subsidiary of clothing and shoe manufacturer Reebok International Ltd., said his company has real concerns about the possible effects of the new licensing schemes for XP.

Crafton said he attended the conference to investigate alternatives for his company's 450 PC users in Indianapolis. The company also has thousands of machines around the world for its sales and marketing staff.

"Linux is the one that if we decide to change, and it looks like they will . . . they would go with," Crafton said.

Analyst Bill Claybrook at Aberdeen Group Inc. in Boston said he thinks that the future of Linux tied to how it's marketed and supported by large IT vendors, including IBM and Hewlett-Packard Co.

Though corporate IT departments are paring their expenses and looking for cheaper alternatives, "I don't see a wave of that happening" that directly benefits Linux, Claybrook said.

Still, he said, Microsoft licensing worries could play a role in the months ahead.

"There are a lot of people who would like to find a way of getting out from under the thumb of Microsoft," Claybrook said.

User Impact Key to Open-Source Future

The Linux operating system celebrated its 10th birthday last month, but even as that milestone was lauded last week at the LinuxWorld Conference & Expo in San Francisco, Linux creator Linus Torvalds and other open-source gurus proposed some very different ideas of what will come next for the community.

The wide range of thinking about an operating system that's still emerging, in many respects, reflects what supporters say is an inherent strength of the open-source model: It brings together many minds to work on a problem. But it also illustrates an inherent weakness: No single person or entity is leading Linux or open-source development into the future.

According to Torvalds, that's the way it should be: Developers should create code to suit only their own needs, while paying little attention to the rest of the world.

"There is no [one] thing that matters" in the future development of the Linux operating system, he said. "You should not think that we have a direction and that's where we want to go. That's what a company does."

TORVALDS: "You should not think that we have a direction" like a company does.

Dirk Hohndel, who last week announced his departure as CEO of Germany-based SuSE Linux AG, strongly disagreed. Developers must address the needs of users to build support for Linux and open-source software, whether as a community or as a company, he argued.

"If you don't like calling them customers, call them users – I don't care – if you are so scared of calling it a company," Hohndel said. "This is something that people on the outside need and want."

Red Hat Inc. President and CEO Matthew Szulik said the open-source community has helped bring maturity to Linux in the past 10 years and now must look outside itself and become a real option for users in a commercial world dominated by proprietary software.

What's critically needed, Szulik said, is for open-source developers to begin to share the wonder and promise of open-source software with users who are clamoring for better, cheaper software. To do that, he said, open-source developers must walk away from their Internet connections and go out into their communities, evangelizing about the benefits of software that isn't tied down by restrictive licenses and burdensome technical requirements.

"It starts off by being an active voice in your community," Szulik said. "There are young people who can gain from your extraordinary gifts."

Instead of just debating the future with one another in online discussion forums, creators of open-source software and systems should take their cases to classrooms and onto the floor of Congress to galvanize support for open-source software, Szulik said.

"It's my belief that the open-source community across the country can help [others] gravitate to this," he said. "We should see this as a wonderful opportunity."

To that end, Red Hat is exploring the possibility of creating a nonprofit foundation to promote open-source software use in schools, Szulik said. The company has been talking with other nonprofits to gather ideas and potential funding sources.

"It just has to start with a spark," Szulik said.

– Todd R. Weiss

BRIEFS

IBM Releases WebSphere for Linux

IBM has announced the availability of its WebSphere Commerce e-business suite for systems running Linux. The suite, which includes Java programming models, is available starting today for $45,000 per processor. It runs on SuSE Linux on IBM's eServer zSeries servers.

Corel Yields Linux Unit

Ottawa-based software maker Corel Corp. last week announced that it will spin off its Linux unit under the guidance of a small start-up, handing over the technologies behind its implementation of the open-source operating system. Xandros Corp., also in Ottawa, will pay Corel $2 million in cash to use its Linux operating system to create a line of desktop and server products.

Sun Earnings Lagging

Sun Microsystems Inc. last week warned investors of a possible loss in the current quarter because of weak sales in Europe and Japan. Sun officials said the company is unlikely to reach the $3.7 billion revenue target it previously said it would need to break even this quarter. However, demand for Sun's high-end server and workstation products in the U.S remained consistent with the company's expectations, officials said.

Study: Optical Fiber Poised for Growth

Cahners In-Stat Group last week said that by 2005, it expects a compound annual growth rate of 23% in the use of optical fiber deployed between LAN switches and network interface cards connecting PCs. It predicted that fiber optics will account for about 13% of all individual connections in LANs by 2005, up from 11% last year. Newton, Mass.-based Cahners also predicted that wireless will account for about 4% of all the ports in LANs by 2005, an increase from 1% this year.

Service Providers Driving Major Changes in Hardware

Upside for enterprise data centers: cost savings in managing server resources

BY JAIKUMAR VIJAYAN

HARDWARE changes that are being accelerated largely by the demands of the service provider (xSP) market are giving enterprise data centers brand-new, cost-effective ways of deploying, scaling and managing their server resources.

The growing availability within the past 18 months of slimmer, highly rackable servers, capacity upgrade-on-demand technologies, workload management software and usage-monitoring tools is the result of vendors responding to xSP needs, according to users and analysts.

"Hardware vendors tend to go where the revenue is," said Josh Turiel, network services manager at Holyoke Mutual Insurance Co. in Salem, Mass.

And for some time now, the application service provider (ASP) market has represented the bulk of that revenue opportunity, said Jonathan Eunice, an analyst at Illuminata Inc. in Nashua, N.H.

XSPs have tended to buy servers by the hundreds and have therefore needed to be highly organized about housing their systems, servicing them, providing power to them and managing them, Eunice said.

As a result, they created a "strong demand for partitions, capacity on demand, workload management, smart switches, online maintenance and a dozen other hot-button features," Eunice said.

More Than the Box

Hardware companies such as Hewlett-Packard Co., Sun Microsystems Inc., IBM and Compaq Computer Corp. have responded by going after the xSP market with a variety of targeted technology and service programs, said Eric F. Goodness, an analyst at Gartner Inc. in Stamford, Conn.

"Hardware vendors are realizing that it is just not about pushing boxes any longer," Goodness said.

Their experience supporting the needs of the ASP market has shown that hardware vendors don't just have a single "technology function, but one that involves the facilitation of the business process as well," he added.

"[HP] has used service providers as a design center for our technology," said Mark Hudson, a worldwide manager in the enterprise server division at HP.

> Hardware vendors are realizing that it is just not about pushing boxes any longer.
>
> ERIC F. GOODNESS, ANALYST, GARTNER INC.

Today, many of those technologies from HP and other vendors are beginning to find use in enterprises as well, as data centers look for ways to cut costs and improve service, Hudson said.

The growing popularity of slim, rack-mountable servers is one example. Barely three years ago, few vendors offered them as a part of their standard enterprise offerings. Today, they are common across every server lineup, as vendors have responded to xSP needs for space-saving systems that can be easily "racked and stacked" on top of each other.

Holyoke Mutual plans to use such thin servers and an array of shared storage servers to replace its current server architecture, Turiel said.

"The approach should let us utilize power and space more efficiently . . . and I'd expect to see better availability than I would with monolithic standalone servers," he said.

The demand from xSPs for servers that can be easily expanded to handle sudden increases in workloads has also led to a proliferation of capacity-on-demand options from all of the major hardware vendors.

Using those options, enterprises can typically buy a system with more processors than they initially need and then turn on processors instantly as their capacity needs increase. This typically allows for lower upfront costs and better use of resources, according to analysts.

HP's Superdome Unix server and Sun's high-end Ultra-Enterprise servers are both examples of large systems that support such capabilities.

A host of partitioning technologies, remote management capabilities and tools for usage metering and usage analysis are also increasingly bundled into such servers.

These types of technologies will increasingly let data centers provision out capacity and charge for it on a usage basis, much like ASPs do today, said David Krauthamer, MIS manager at Advanced Fibre Communications Inc., a telecommunications equipment manufacturer in Petaluma, Calif.

Technologies like these "take your focus away from [managing] the infrastructure piece and let you focus on the value-add piece, which is the application," he said.

[illegible]	[illegible]	[illegible]
Slimmer, denser, rackable servers	Sun Netra, IBM eServer P Series 640, HP Netserver LP 2000r	Saves companies space, improves manageability
Capacity on demand	HP Superdome, Sun E10000	Provides instant additional capacity when needed
Utility pricing	HP Superdome	Allows data centers to charge for service based on usage
Online addition and removal of components	Sun E1000	Allows systems to be repaired or upgraded without shutting down everything

Quick Link For access to *Computerworld's* xSP Knowledge Center, visit our Web site.
www.computerworld.com/q?n2300

Continued from page 1

Taxes

states can work together to make something happen here, in terms of simplification of sales tax administration," and second, "that there is technology out there that can aid retailers in collecting sales tax in a multistate environment," said Diane Hardt, co-chairwoman of the Streamlined Sales Tax Project.

IT and tax managers said that for a remote tax transaction system to work, it must address security, the transaction-processing speed and the accuracy of the tax calculation. But if those concerns can be satisfied, the potential benefits, including reduced compliance costs, will be attractive to firms, they said.

If the remote process eliminates a company's audit exposure by state tax examiners, "that is definitely a sales point" for the system, said Emilio Amalfitano, manager of tax technology at Viacom International Inc., a New York-based media giant.

The states' motive by states for tax simplification stems from a desire to impose collection obligations on remote merchants who aren't required by law to collect sales tax unless they have a physical presence in the customer's state. Without a simple way for businesses to comply with the states' desired tax rule changes, Congress is unlikely to approve broader tax collection obligations, said state officials.

The largest company participating in the initial pilot program is O.C. Tanner Co., a privately held firm in Salt Lake City that makes employee-recognition awards and will create the medals for the 2002 Winter Olympic Games. The company is running the pilot only on an e-commerce server used for the sale of Olympics-related merchandise.

O.C. Tanner is already obligated to collect taxes in all 45 states that have a sales tax. The company said it's working on the pilot program with the goal of reducing administrative overhead in tax processing. For instance, four employees spend one week each month preparing state sales tax returns, said Jake Garn, the firm's tax manager.

Brad Lemke, the lead developer in the company's e-commerce section, was working last week on resolving remaining issues with the test server. A key problem is speed; sales tax transaction time is taking about 1.5 seconds. "A second or less would be great," he said.

If the remote server is unavailable, the system is designed to switch to Taxware software running locally. Unresolved in the pilot agreement is who will maintain the local tax software, which requires ongoing updates.

Only four states — Kansas, Wisconsin, North Carolina and Michigan — are participating in the pilot so far, but a total of 39 states are involved in the Streamlined Sales Tax Project.

Although the sales tax project is focused on retail, the planned revisions in tax code definitions have implications for many businesses, particularly in terms of which digital products are subject to taxes and which rules are applied to services, said William Luethge, director of property and sales taxes at Delphi Automotive Systems Corp. in Dayton, Ohio. "It's going to have some collateral effects," he said.

Remote Sales Tax Processing

The first of several expected pilot programs for sales tax processing was scheduled to begin last week.

Who is involved: 39 states are participants in the Streamlined Sales Tax Project, but only four are in the pilot.

Merchant benefits of remote processing: No tax collection or return obligations. Vendor handles routine audits.

IT issues: Transaction speed, processing accuracy, security.

Potential pilot turnoff: Vendors that participate must agree to collect sales taxes in pilot states, even if they don't now have an obligation to do so.

Who pays: The issue is undecided. States could pick up of some of the cost of sales tax collections.

Vendors involved: Esalestax.com Inc., Pitney Bowes Inc. with subcontractor Vertex Inc., and Taxware International are participating in two pilot programs using subcontractors HP and Pitney Bowes.

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Net Tax Ban Up For Extension

Congress returns from its recess next week and is expected to consider extending a three-year moratorium on Internet access taxes that's set to expire in October.

The legislation, passed in 1998, bans states from imposing taxes on charges levied by Internet service providers. Congress is considering extending the ban for five years, although some advocates want a permanent ban.

If the ban isn't extended, Internet access prices could increase if tax administrators apply sales taxes to such services. But "a lot of states don't seem that concerned about Internet access fees, they are much more concerned about tangible goods," said Karl Frieden, a tax expert at Chicago-based consultancy Andersen, referring to the sale of goods by out-of-state vendors that aren't charged a sales tax.

Extending the moratorium also puts pressure on the states to simplify existing sales tax structures, "and that is what business wants," said Mark Nebergall, president of the Software Finance and Tax Executives Council, a Washington-based association of software vendors and IT consulting firms that supports the moratorium on new Internet taxes.

– Patrick Thibodeau

Continued from page 1

Informix Users

"I can assure you that the users' No. 1 concern or fear is being seduced and abandoned," said Nick Nobbe, president of the Washington Area Informix User Group in Annandale, Va. "IBM has so far shown a sincere commitment to the longevity of the product line, and I think most of our users are reassured that this is the case."

But Tim Shaefer, president of Data Design Technologies Inc. in Boca Raton, Fla., isn't so sure. Although IBM continues to support other product lines it has purchased, such as those of Lotus Development Corp. and Tivoli Systems Inc., Shaefer said "it's highly unlikely" that it will do so with Informix, "because IBM already has considerable marketing behind DB2, a database engine very similar to Informix."

Will Informix customers move to DB2, as IBM hopes they will? "Only if they have to," said Shaefer. "And then, only if they find other choices more daunting. . . . IBM doesn't have anything in data warehousing, so [Informix Extended Parallel Server] is still a very viable choice."

At an Aug. 22 press briefing here, Janet Perna, general manager of data management solutions at IBM Software, reiterated a promise she made in a letter to all 120,000 Informix users July 2. "As long as customers want it, we will continue to invest in [Informix] products," said Perna. "We're not hit-and-run people."

In fact, despite IBM's plans to begin integrating Informix technology into its own flagship database product, DB2, the companies plan to release several new versions of Informix products, said Brian Staff, vice president of marketing at Westboro, Mass.-based Informix.

"We've committed to at least two releases of all of the enterprise servers in the next six months," he said.

In a recent interview, Carl Olofson, an analyst at Stamford, Conn.-based Gartner Inc., said that Informix users "have been fanatically loyal so far" and that IBM has the potential to add considerable substance to DB2, as long as it can "keep faith with them."

That shouldn't be a problem, said Perna, who added that both IBM and Informix "had a number of mutual customers who actually asked us" to protect the future of the Informix product line through an acquisition.

Although mergers and buyouts tend to make all users nervous, "a product with a strong customer base almost never gets dumped," said Dean Lesner, president of the San Francisco Bay Area Association of Database Developers.

But some analysts wonder how long IBM will continue to support Informix products and whether support translates into meaningful upgrades. If IBM tries to maintain all of Informix's seven different product lines, "that's going to be a problem for them," said Burton.

Only time will tell if Informix users will freely migrate to DB2, said Phil Russom, an independent analyst.

"Since [Informix users'] options are limited, in terms of finding a platform that's a true replacement for [Informix Dynamic Server], Informix users may have no choice but to wait for IBM to fold IDS's hybrid capabilities into DB2," he said. "This seems like a forced migration to me."

MORE THIS ISSUE
To learn more about IBM using Informix technology in DB2, see page 21.

Service Providers: The New Breed

The Application Service Provider model has grown up and become what the IT user really needs these days, namely a Full Service Provider or FSP Sharing the same monthly subscription or usage-based fee structure as the ASP model the FSP model provides IT with consulting, application customization and integration, managed services, hosting, and other vital enterprise services

"It has become increasingly difficult for IT departments to maintain all the connectors between their own custom code and today's enterprise applications, which are constantly being modified," says Tony Summerlin, Vice President of e-Business Strategy at Unisys Corp. "That's where the FSP can help. As you consider your legacy systems, the more you try to integrate new applications, the more the FSP is relevant."

Summerlin notes that the FSP model plays perfectly into the core strengths of Unisys and its rich experience in providing enterprise information solutions, application customization, and data center infrastructure.

For more information about this exciting new generation of service provider and end-to-end platform independent services from Unisys, click on **www.unisys.com/e-biz/FSP** today.

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Medical Imaging Strains Storage

But advances in data handling are helping

BY LUCAS MEARIAN

ADVANCES IN digital imaging technology are making X rays, CT scans and other medical tests increasingly effective. But they're creating a huge challenge for hospital IT managers who are charged with storing and distributing all that digital data.

The good news is that storage technology is also advancing. For example, Eastman Kodak Co. this month will begin shipping a rack-mouoted storage unit for digital images. Rochester, N.Y.-based Kodak said it will use Hopkinton, Mass-based EMC Corp. as its preferred provider of storage hardware and software for the system.

That development was welcomed by IT managers in the health care industry such as Jeff Partee, CIO at Wilson Memorial Hospital in Sydney, Ohio.

Partee recently installed a picture archiving and communications system (PACS) from Kodak that allows the hospital to manage more than a terabyte of digital images oo oetwork-attached storage devices.

While computer radiology technology has existed for 20 years, the merging of proprietary medical systems with industry-standard data storage and network equipment is a new trend driven in part by greater patient demand and regulations requiring high-resolution digital images for diagnoses, he said.

"The higher the resolution, the more the pixels. The more pixels, the more storage," said John Webster, a storage industry analyst at Illuminata Inc. in Nashua, N.H. "That's what the medical community is driving toward."

For instance, at Marion General Hospital in Marion, Ohio, display devices for technicians who make diagnoses from magnetic resonance imaging (MRI) and computerized tomography (CT) scans use 5-megapixel monitors with a resolution of 2,000 by 25 pixels.

"Obviously, trying to deal with that was much more difficult and required more proprietary systems in the past, whereas today there are many more off-the-shelf versions of hardware and software for it," said Ken Rosenfeld, director of PACS at Marion General.

The Health Insurance Portability and Accountability Act, a set of federal regulations intended to protect and simplify the exchange of health care data, is driving the use of more standardized technology to store digital images and patient records, said Barry Hieb, a physician and analyst at Gartner Inc. in Stamford, Conn.

"If you have a paper record, you make a Xerox copy of that paper and you've totally lost control of it," he said. "... the other hand, if I have the patient's ... formation in digital form, you can do ... sorts of things to protect it."

Last month, Kodak agreed to ... EMC's Clariion FC4700 disk array a... related software to create storage-a... networks (SAN) for users of the PA... Partee said EMC's entry into the me... ical imaging arena is a significant bo... to medical storage and retrieval te... nology. "I believe the future of t... product will probably be ... large RA... farms," he said.

In the past, the medical commun... used digital imaging and communi... tions in medicine as the interface ... tween medical imaging devices a... workstations, printers and other co... puter devices. But with greater trans... speeds available through Ethernet a... Fibre Channel networks, there has be... a steady shift to newer connectiv... technology.

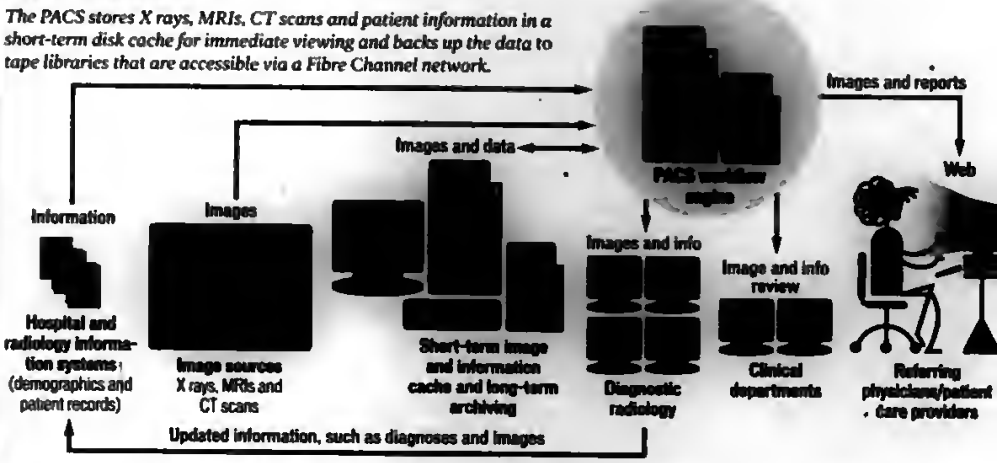
Partee said he's planning an upgra... in the next six months to a SAN arc... tecture that can also distribute vid... images from cardiac catheters.

Moving from film to storing digi... images on RAID and tape devices h... allowed the hospital to almost doub... the number of patient images that c... be viewed by medical technicians ... 50,000 per year, cut out $87,000 spe... annually on processing X-ray films a... eliminated the need for physical war... houses for patieot film records.

Hospitals such as Kettering Mem... rial Hospital in Dayton, Ohio, and Ma... on General are saving more th... $500,000 per year on film expenses a... said they expect a return on investme... io five years.

PACS Workflow

The PACS stores X rays, MRIs, CT scans and patient information in a short-term disk cache for immediate viewing and backs up the data to tape libraries that are accessible via a Fibre Channel network.


Images and reports
Images and data
Web
Information
Images
Images and info
Image and info review
Hospital and radiology information systems (demographics and patient records)
Image sources X rays, MRIs and CT scans
Short-term image and information cache and long-term archiving
Diagnostic radiology
Clinical departments
Referring physicians/patient care providers
Updated information, such as diagnoses and images

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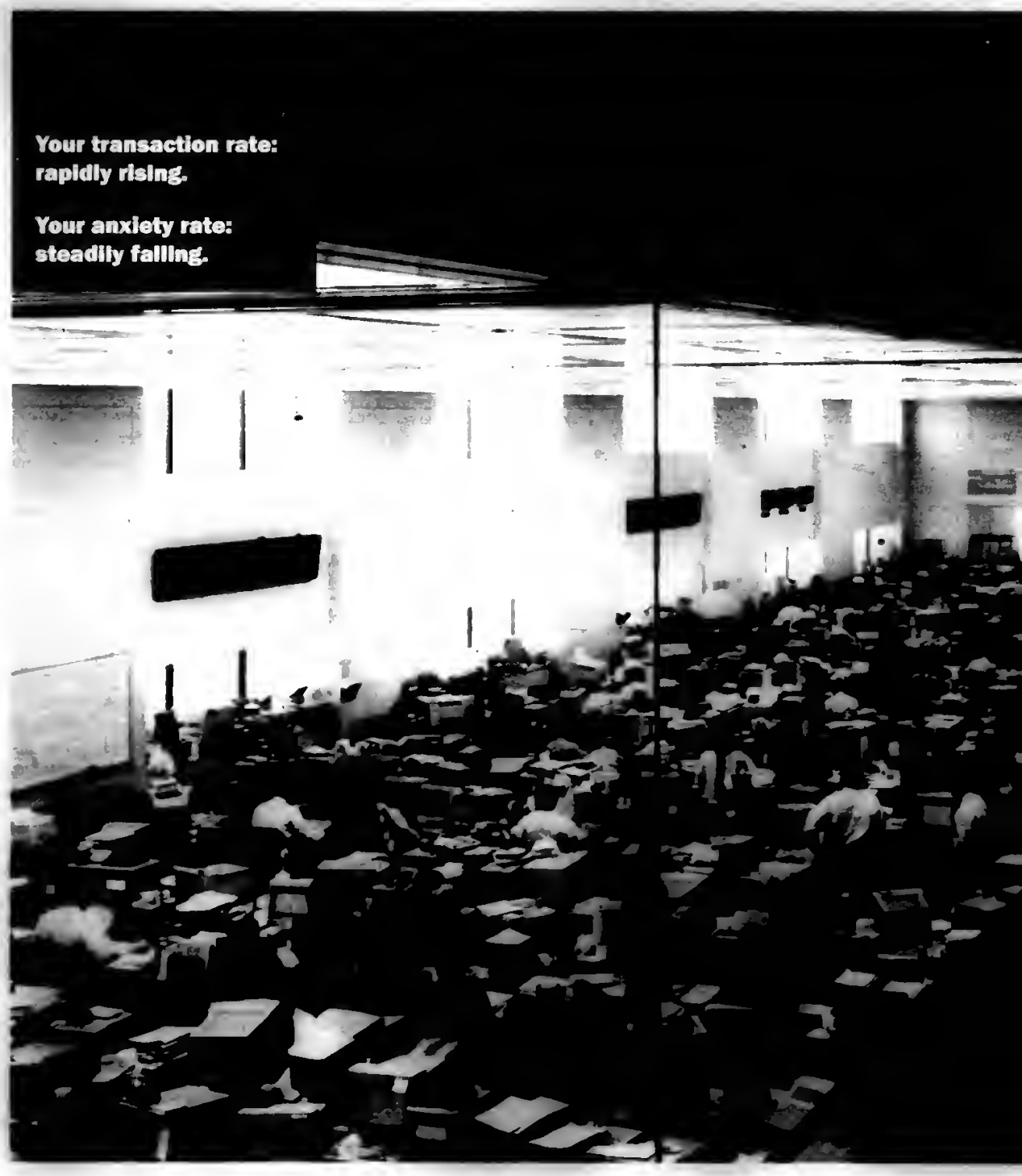

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Visit www.unisys.com/[illegible] for press release. 10,200 SAP SD Standard Application Benchmark certified by SAP 3/31/2000 Sun E10000 1.88 second Average Response Time (Dialog), 5,864,000 Dialog Steps/Hour 1,954,670 line items per hour SAP R/3 4.0B 64a 400MHz UltraSparc II processor 64GB mem
trademark of the Transaction Processing Performance Council, www.tpc.org. TPC results as of 6/12/01

MICROSOFT SQL SERVER 2000. The company continues to grow and grow. And your system's transaction rates are climbing in lockstep with it. A big deal, for sure—but nothing to get anxious about. That's because SQL Server 2000 offers scalability for even the most demanding environments. So you know that no matter how much—or how fast—your system needs to expand, you'll have the tools to handle it.

Part of the flexible Microsoft .NET Enterprise Server family, SQL Server 2000 recently achieved 20,000 SAP Standard Sales and Distribution (SD) Application Benchmark Users with a response time of 1.91 seconds on a 32-processor Unisys ES7000 system running as the database server in a R/3 4.6C 3-Tier environment, surpassing a result achieved with Oracle 8.1 running on a Sun system with 64 processors.* In addition to world-class performance, SQL Server 2000 has price/performance numbers that are 2.5 times better than the closest competitor.† Add to that native XML support in SQL Server 2000 and you've got the database that's ready to handle Web-enabled enterprise applications far into the future.

SQL SERVER 2000 BENCHMARKS

Application/Workload	World Record Results
SAP R/3 Sales & Distribution	20,000 concurrent users
TPC-C	686,220 tpmC††
PeopleSoft 8 CRM	20,000 concurrent users
PeopleSoft Payroll	12,000 concurrent users
Ask Edwards OneWorld	4,500 concurrent users
Dell	32,000 concurrent users

To get the full story on Microsoft SQL Server 2000 scalability, go to **microsoft.com/sql/worldrecord** Software for the Agile Business.

Microsoft

*Benchmark by SAP 6/12/2001. Unisys ES7000: 1.91 second Average Response Time (Dialog), 6,046,000 Dialog Steps/Hour, 2,015,330 line items per hour. SAP R/3 4.6C, 32x 900MHz Pentium III Xeon processor, 128GB memory, DBMS: Windows 2000, SQL Server 2000 SP1. Visit www.sap.com/benchmark for link to benchmarking data. Sun: 64, Oracle 8.1.5. †Most SQL Server price/performance = Dell PowerEdge 6400, 20,332 tpmC, 6.65 $/tpmC, available 2/2/01, compared to best competitor (Sybase) is HP 3000 Model L2000, 22,423 tpmC, 16.43 $/tpmC, available 4, 5/01. ††IBM e-server xSeries 370 /MP 700 tpmC 27.46 $/tpmC available 5/31/01. TPC is a

Israeli Bank Pushes Wireless Service Despite Low Usage

Industry analysts consider technology necessary to attract, hold customers

BY LUCAS MEARIAN

DESPITE HAVING a mere 100 users per day for his company's year-old wireless service, Meir Shor, CIO at Tel Aviv-based Bank Leumi le-Israel BM, is pushing an IT project that in the next few months will add Web- and wireless-based account aggregation and transaction capabilities.

"It's true [adoption] is going slower than expected because of... the requirement to have a certain type of phone in order to use it. But if you talk long term, wireless is one of the bigger areas of banking," Shor said.

Shor's sentiments have been echoed by global financial services executives and industry analysts alike, who see mobile services as a feature that could help businesses attract and keep customers.

Bank Leumi is one of Israel's two largest banks, with assets nf $90 billion. The wireless project, which lasted three months and was completed last year, cost more than $100,000. It required an additional five servers for Web connections, as well as data backup and disaster recovery capabilities. Shor said the applications were relatively easy to install.

Bank Leumi's wireless service is based on the Small Message Service (SMS) protocol, which lets messages of up to 160 characters be sent over the IP network.

During the project, time was equally split among the requirements stage, the implementation phase and the testing stage.

Shor allocated two full-time IT staffers to the project and coordinated the rest of tbe installment with consultants from his wireless technology vendor, Orsus Solutions Ltd. in Mountain View, Calif.

"The basic installation is very straightforward," said Ralph Kahn, director of engineering at Orsus. "You simply drop some files into the Java directory on [Windows 2000, AIX or Solaris] servers."

More difficult, according to Shor, is establishing relationships with various wireless providers that can support the service, a problem that would be exacerbated for banks in the U.S., where multiple types of wireless networks are owned by dozens of carriers.

"We use older-generation networks that just aren't as fast," said Jim Van Dyke, an analyst at Jupiter Media Metrix Inc. in New York. "I don't know if you've tried to send an instant message on a cell phone, but it's painful. I'd rather get a root canal."

While most large financial services companies have considered aggregation services over wireless, virtually none has accomplished it, according to Van Dyke.

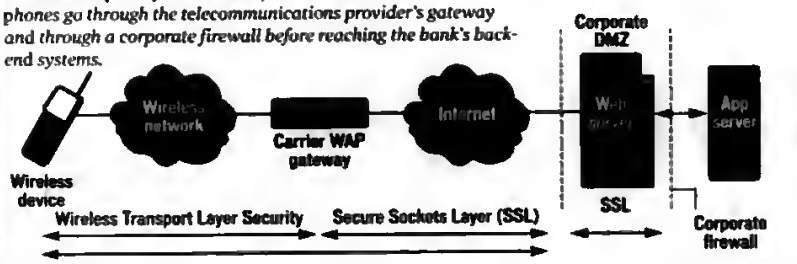
Currently, Bank Leumi's 80,000 mobile customers can access their account, credit card, loan and investment information in English or Hebrew. They can also obtain foreign exchange rates and receive alerts. Soon the bank will add the ability to perform transactions, something analysts say is nearly nonexistent in the U.S. because of low user adoption rates.

Ed Kounze, an analyst at TowerGroup in Needham, Mass., said that among U.S. banks that offer wireless, only 0.5% to 1% of customers repeatedly use their mobile services. In many parts of Europe, that number jumps to 5% to 7%, according to Kounze.

The difference, in large part, is because of a more sophisticated wireless network overseas, as well as more Web-enabled telephones that use the SMS protocol.

Banking on Wireless

Customer requests for account information via Web-enabled cell phones go through the telecommunications provider's gateway and through a corporate firewall before reaching the bank's back-end systems.



Veridian Tapped to Track Foreign Hackers

Intrusions against DOD to be studied

BY DAN VERTON
WASHINGTON

The Defense Intelligence Agency (DIA) said it plans to award a contract to security firm Veridian to study intrusions and attacks against U.S. Department of Defense (DOD) networks "from computers located in a particular foreign country." According to Intelligence experts, that country is China.

Former intelligence officials, speaking on condition of anonymity, said the contract with Arlington, Va.-based Veridian to analyze intrusion data and produce a list of specific IP addresses that may pose a threat to DOD networks is an effort to determine the "level of activity" of China's information warfare program.

"They want to see if they can target a specific country and determine if the intrusions are kids using China as a jumping-off point or a government program," said one former official.

At least 20 countries, including Russia and China, are known to be developing information warfare strategies that specifically target U.S. military and private-sector data networks, according to recent DIA and CIA investigations.

However, officials say China has been especially active. The fear is that computer viruses and worms unleashed by foreign hackers could wreak havoc on the U.S. infrastructure in the event of a military conflict.

One former official said the U.S. Department of Energy witnessed a tenfold increase in intrusion attempts originating from China during the espionage investigation against Chinese-American physicist Wen Ho Lee. Part of the Veridian contract calls for the firm to correlate hacking incidents with specific world events.

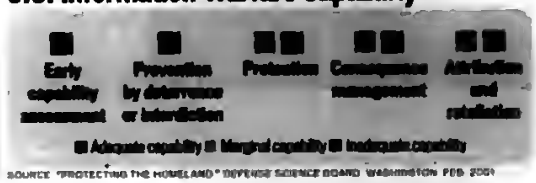
The contract, which was announced last week, also calls for Veridian to study intrusion data from "computer viruses that show evidence of being under the control of people in that country, who range from hackers to government personnel."

Likewise, the resulting Veridian study must include a time line and link analysis, a list of DOD systems attacked, computer network functions attacked, specific attack methodologies found and patterns and trends in hacker tool sophistication.

However, officials pointed out that Veridian will be collecting the data from the DOD's Computer Emergency Response Teams, not directly from Chinese systems.

Veridian declined to comment on the contract.

U.S. Information Warfare Capability



SOURCE: "PROTECTING THE HOMELAND," DEFENSE SCIENCE BOARD, WASHINGTON, FEB. 2001

BRIEFS

CA Board Re-elected, Defeating Wyly Slate

Shareholders last week re-elected Computer Associates International Inc.'s board, defeating the slate proposed by Texas investor Sam Wyly. According to Islandia, N.Y.-based CA, all of the company's 10 incumbents received at least 75% of the vote. The shareholders also ratified the appointment of New York-based KPMG LLP as CA's independent auditor for its fiscal year ending March 31, 2002, and approved the 2001 stock-option plan. Final tallies are expected later this month.

Gateway Restructures

Direct PC seller Gateway Inc. last week announced plans to restructure its operations and cut 25% of its global workforce, or about 5,000 jobs. The moves, which the San Diego-based company said will bring it back to profitability by the end of its fiscal year, are expected to cost about $475 million in the third quarter. Citing plans to focus on what it considers to be its strongest market, the U.S., Gateway also announced that it will close its facilities in Japan, Australia, New Zealand, Malaysia and Singapore. The company said it's reviewing whether it should exit the European market.

Short Takes

North Vancouver, British Columbia-based customer relationship management (CRM) software firm PIVOTAL CORP. last week announced that Bo Manning has been named president and CEO, replacing co-founder Norm Francis, who will continue as chairman of the board and as a strategist at the company. Pivotal also announced that it has joined with INTEL CORP. to develop, market, sell and service multichannel CRM offerings. . . . Napa, Calif.-based electronic payment software vendor eONE GLOBAL LP will acquire the mobile-business division of San Jose-based BROKAT TECHNOLOGIES INC., which develops software and infrastructure for wireless applications.

DB2 Gets Boost From Informix Acquisition

IBM puts R&D on fast track to integrate new features into database application

BY DAN VERTON
SOMERS, N.Y.

IBM HAS FINISHED work on the code for the next version of its flagship DB2 database software — the first version to incorporate technology gained from the company's acquisition of Informix Corp.

IBM is testing the code and plans to release the next version of DB2 next summer, said Janet Perna, general manager of data management solutions at IBM Software, in a recent briefing here.

On July 1, IBM conducted the final transfer of the $1 billion it pledged to acquire Westboro, Mass.-based Informix's ailing database business.

IBM has begun the process of integrating Informix technology into DB2. The addition of 600 research-and-development personnel from Informix now puts the size of IBM's R&D community at more than 3,000, and DB2 enhancements are on a fast track, said Perna.

"It's about acceleration and moving further ahead faster," she said, declining to speculate if and when IBM's 30.1% database market share would surpass Oracle Corp.'s 33.8%. The next version of DB2 is likely to include Informix's multimedia data management modules, known as DataBlades, Perna said. But "it will probably take us two to three years to complete all of the integration," she acknowledged.

In addition to increasing scalability and availability, the combined engineering staff is concentrating on XML, said Don Haderle, chief technology officer for DB2 who is known at IBM as "the father of DB2." XML "offers an inroad to semantic understanding and linguistic analysis of huge databases" in the range of 400 petabytes, he said.

Price and performance "were the key drivers for us back in the 1970s," Haderle said. "While that is important today, the most important attribute is scale. DB2 is transforming into an XML query processor."

The future DB2 will focus on Web services and managing "any information, any format, any vendor and any platform," according to Perna.

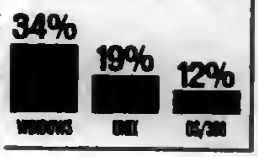
Still, I/O bandwidth remains a significant challenge, said Bernie Schiefer, manager of DB2 performance and advanced technology at IBM. A partnership formed recently with Intel Corp. has produced InfiniBand, a technology designed to address the bandwidth problem. According to Schiefer, the technology eliminates bottlenecks in the data bus by enabling DB2 to communicate directly with the storage subsystem.

Intel and IBM demonstrated InfiniBand last week at the Intel Developer Forum. DB2 Version 7.2, released in June, already supports InfiniBand. During the live demonstration, DB2 ran a Linux cluster of 12 nodes in addition to software from SAP AG.

"The challenge IBM has to deal with is continued execution," said Betsy Burton, an analyst at Stamford, Conn.-based Gartner Inc. "It's not a technology issue with IBM. The big question is, are they going to keep the steam rolling?"

On a Roll

IBM DB2 worldwide revenue growth (first half of this year)



SOURCE: IDC, ANALYSIS

PeopleSoft CEO Touts Strong Revenue, Software Release

Despite the generally gloomy climate for IT, PeopleSoft Inc. in Pleasanton, Calif., is showing strong revenue growth and appears to be on course in delivering PeopleSoft 8, a full set of collaborative, Web-based applications. At the business software vendor's annual user conference in Atlanta last week, PeopleSoft President and CEO **Craig Conway** *sat down with* Computerworld's *Marc L. Songini to discuss the company's performance and the release of PeopleSoft 8.*

Q: How is the upgrade effort to PeopleSoft 8 going among users?

A: Way better than we'd hoped. We don't have any users that have migrated to PeopleSoft 8 and said anything [other] than that it was a very direct migration and better than they expected it to be. By comparison to the competition and their very visible user horror stories, we feel pretty relieved. We have approximately 5,000 customers. We have shipped it to 2,000 customers that have requested it. There are 200 customers that have completed that migration and are live on all the modules they are licensed for. I think we'll have 500 to 700 completely live by the end of the year.

CONWAY: PeopleSoft 8 upgrades are going "way better than we'd hoped."

Q: What have you done to ease the migration?

A: We've put a number of things in place to make it quick and easy to upgrade. We've got upgrade tools and scripts, and then there is a service package we've put together with our implementation group and our partners to package the services to upgrade a company. Most upgrades . . . are happening [within] anywhere from five to eight weeks. We have documented upgrades of as few as 30 days, but the average is five to eight weeks.

Q: You claim that your applications will work with other vendors' software. Is that a change in strategy?

A: PeopleSoft has always had a best-of-breed product strategy. SAP and Oracle have always been the opposite. We started out only as a human resources software vendor, so we had to integrate with SAP and Oracle.

It's proving to be the smart position to take. If you've noticed, SAP and Oracle have started to promote a position that's similar. Historically, they have discouraged customers from mixing and matching software.

Q: Where is PeopleSoft going in the next six to 12 months?

A: The next area of technology that will offer an enormous benefit will be enterprise service automation. It's the largest [expense] a company has, and yet it has not been automated. An enormous amount of attention has been spent on the online procurement of pencils, but a company spends exponentially more on temps and on contractors and on landscapers.

If you can help a company automate and manage and control service spending, you can save most large companies tens of millions of dollars.

PATRICIA KEEFE

Getting Back to Basics

IF IT SOUNDS TOO GOOD TO BE TRUE, it probably isn't. In the case of the dot-coms, it was — but only for a short while. The problem, of course, is that much like the stock market in the Roaring '20s, most of these ventures were built on air. Many had no products, and those that did lacked distribution or support. Fundamental laws of business were tossed out the window by

PATRICIA KEEFE is *Computerworld*'s editorial director. You can contact her at patricia_keefe@computerworld.com.

people who should have known a lot better. Eventually, it all collapsed. Anyone paying any attention should have seen it coming.

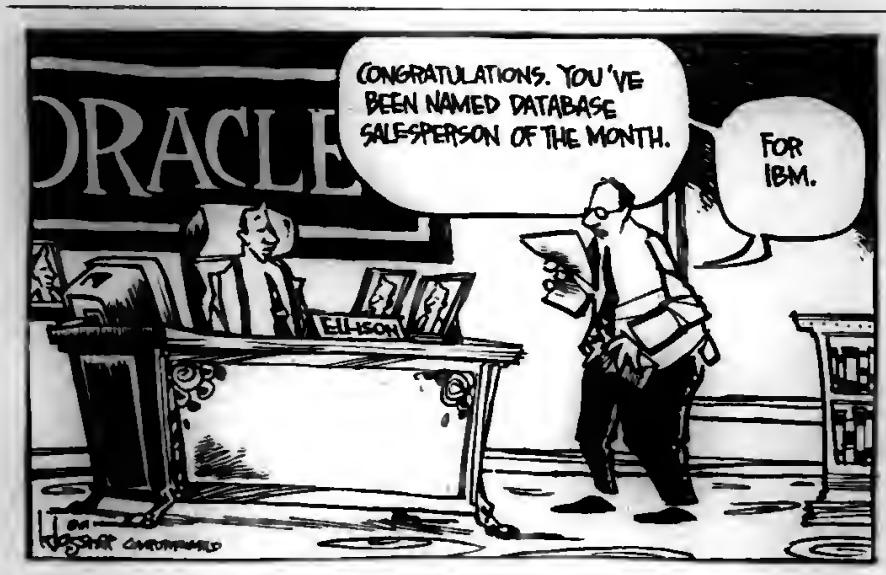
Yet for much of the past year, we've been subjected to the blame game, with fingers pointing alternatively at the media, Wall Street, investors and now high-tech research firms. We've needed a scapegoat on which to pin the hype that fed into the frenzy of investment.

The truth is, anyone who bought into the dot-com hype did so because they wanted to. Greed was a driving force. Venture capitalists willingly closed their eyes to ridiculous business plans and nodded assent as start-ups spent lavishly on toys and other silliness.

Market researchers eagerly accepted exaggerated growth numbers from vendors and spit them out in euphoric reports. The media reported every number and made stars of New Economy players. Fearful of being left behind and anxious to cash in, corporations jettisoned the constraints of ROI while government policy-makers had idiotic debates over common-sense issues such as: Do you still need a prescription to buy drugs online? We wanted so bad for the benefits of the New Economy to be true, and we wanted them now.

So here we are, in the midst of a pretty sobering wake-up call. Yet the waves of financial losses and layoffs won't go on forever. The one bright spot on the immediate horizon seems to be an uptick in IT spending plans, which could reverberate throughout the industry.

It's time to stop playing the blame game and get back to work with a good dose of old-fashioned business sense combined with careful planning and an eye toward a reasonable ROI. This is the "new" hallmark of success. And it's IT leaders like you who can and should repave the way. ◗



PIMM FOX

Layoffs Can Also Harm the Corporate Net

THE EMPLOYMENT picture makes everyone feel horrible. Those being laid off must re-create their lives, while those who remain must grapple with losing friends and colleagues. And unfortunately, IT personnel must reckon with potential security threats from disgruntled former employees.

PIMM FOX is *Computerworld*'s West Coast bureau chief. Contact him at pimm_fox@computerworld.com.

Because whether we admit it or not, 70% of computer attacks come from inside enterprises, according to the FBI. The estimated cost last year to U.S. businesses for these cybercrimes was $265 million.

Last March, Verizon disclosed that one dismissed worker who pleaded guilty to damaging a network service support center caused $200,000 in damage.

So, no matter how much you may wish to ignore the risks, your IT systems must have effective means to guard against malicious activity from former users.

As a prerequisite to any technology solution, such as automated passwords or account management controls, you must have direct dialogue between IT security and the business managers who are responsible for layoffs. If you don't know who is being laid off until human resources has processed paperwork and the payroll department has issued the last check, you're exposed to days, if not weeks, of potential attacks.

IT security departments must also communicate ID and password deletions to their help desks in a timely fashion. Treating the help desk as a second-class citizen in the information loop leaves you vulnerable to smart mischief makers.

In more practical terms, IT security must tackle the human errors when network and application access involves a human interaction.

For example, most password changes are done via a help desk over the telephone. There must be a way to maintain logs of where frequent requests for new passwords are coming from. Also, you must have a way to alert the help desk to potential security risks, such as a nasty termination.

At the back end of your enterprise, you must

Quick Link For more *Computerworld* columnists and links to archives of previous columns, head to: www.computerworld.com/c/7q6000

design systems so as not to put valuable information in places where ex-employees can help themselves. Corporate directories or enterprise databases must be encrypted.

A strong password policy can also thwart former co-workers who know the mothers' maiden names of several employees — a popular password. After all, passwords to networks and databases are often shared within a work group. Remove group passwords and make sure passwords for critical platforms are changed every 30 days, contain at least 12 characters and aren't proper names or words found in a dictionary.

But, of course, the best way to reduce the risk of a technical maelstrom is to handle layoffs in a humane and compassionate manner. That can go a long way toward preventing a vengeful network attack.

DAVID FOOTE

IT Professionals Rake in Bucks Despite Downturn

GIVEN THE slowing economy and gloomy job climate, you might think IT workers are getting hit hard in their paychecks. But the fact is that IT professionals (at least those who still have jobs) are doing remarkably well.

DAVID FOOTE is president and chief research officer at Foote Partners LLC, a management consultancy and IT workforce research firm in New Canaan, Conn. Contact him at dfoote@footepartners.com.

Overall annual growth in base pay is a healthy 9.6% for the 85 IT jobs in my company's just-released second-quarter salary and bot skills pay survey of 28,000 continuously tracked IT workers. That's much better than the general labor market — nearly three times greater, by some estimates.

Network operations and network engineering professionals are doing the best, with increases of 15.8% and 13.8%, respectively, over the second quarter of last year. They're averaging about $94,000 in base salary, $110,600 with bonuses. Business technologists, business applications developers and security professionals increased their base pay by about 12% and are averaging from $99,000 to $135,000 in base salary. Clearly, the demand for top-notch specialists to build and manage key pieces of the e-business technical infrastructure continues to outrun supply, and that's not going to change anytime soon.

Sure, the deflated dot-com balloon reversed the fortunes of workers in many Web-related jobs in the past year: Their pay grew a paltry 3.8%. And several widely publicized failures with big, expensive enterprise systems development projects made companies skittish, flattening pay for data warehousing, customer relationship management and systems engineering jobs.

But how bad can things really be when nearly half of all IT managers and staffers we surveyed earn more than $100,000 in base salary, and 70% exceed that in total cash compensation?

Life remains good for many IT workers. It's still a great career choice, despite all the layoffs. Here are a few factors driving growth in IT jobs.

- Continued expansion of e-business application development.
- An upsurge in outsourcing contracts and continued growth in enterprise-level IT projects, each requiring expert management.
- Increased demand for wireless services and mobile computing capabilities.
- Greater security risks associated with the first three factors.

Salaries for networking, internetworking and security are expected to increase in the next several quarters as more business is launched online, extranet security concerns grow and emerging technology markets, such as wireless, proliferate.

Recent budget cuts hit security professionals hard, but those cuts were only a temporary setback. As I mentioned in my July 9 column ["Companies Need Security Pros With More Varied Skills"], these jobs are rapidly diversifying and expanding into hot new security niches. Security pros should see more hiring and solid pay increases in the next 12 to 24 months as companies wise up to the risks in scaling back security services.

The chronic shortage of skilled IT professionals will continue, fed by even more companies rewiring themselves to the Internet. This will keep pay levels elevated for many jobs, especially those requiring both technology and business-strategy skills.

New opportunities are opening up in the health care and biotechnology industries. Spurred by the Health Insurance Portability and Accountability Act of 1996, health care organizations will soon implement or reconfigure legacy systems to protect patient privacy. It'll be like Y2k all over again.

The bottom line: Expect more team- and project-focused pay during the economic downturn, as budgets undergo case-by-case scrutiny to focus resources on projects that bring tangible, near-term benefits. So, be patient and keep your chin up. Better days are ahead.

READERS' LETTERS

Palm Is Out of Touch With Today's Market

NICE ARTICLE on Talisker ["Developers Receive Talisker Beta Version of Windows CE," News, Aug. 20]. It's a shame that Palm Chief Competitive Officer Michael Mace had to show such complete ignorance of Talisker, Merlin and the Pocket PC. He should know what his competition is doing, even if the code names and purposes of the products can be confusing to the average consumer. As your article stated, Talisker comes with a platform-building Wizard. Mace says, "Our OS is so simple, our developers don't need a wizard." Huh? The wizard is for creating embedded applications for gas pumps, set-top boxes and the like, which can have an infinite combination of CPU types, memory, screen sizes, user interfaces, etc. The wizard isn't for creating yet another solitaire game for the Palm. Mace has just explained, inadvertently, why Palm continues to lose market share. It doesn't understand the market or the competition anymore.

Ed Hansberry
Franklin, Tenn.

Nothing Is Safe

SOMEONE NEEDS to bring balance to these discussions ["Potentially Dangerous Wireless LAN Threats Discovered," News, Aug. 13]. With the definition of security assumed in the wireless LAN discussions, nothing in life is secure. Locked cars aren't secure. Cell phones aren't secure. Homes and businesses aren't secure. Cordless phones aren't secure. Water supplies aren't secure. This rash of articles serves what purpose? Wireless users can use firewalls, VPN security and encryption. The sky isn't falling. Anything can be hacked.

Paul Allen Hanson
Richardson, Texas

Who's to Blame?

IF ONE IS going to compare getting hit by Code Red to getting your car vandalized, we might as well take the analogy a little further [Readers' Letters, Aug. 13]. The hole in IIS could be likened to a door on your car that, due to a design flaw, doesn't lock properly. If your car were vandalized because malicious people knew about this but you didn't, I'm sure you would still blame the manufacturer for the badly designed door, even if there were a mechanical fix available.

Along those lines, people blamed Firestone for the recent problems with its tires, even though there was a fix available (change your tires).

Rob Radez
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COMPUTERWORLD welcomes comments from its readers. Letters will be edited for brevity and clarity. They should be addressed to Jamie Eckle, letters editor, Computerworld, PO Box 9171, 500 Old Connecticut Path, Framingham, Mass. 01701. Fax: (508) 879-4843. Internet: letters@computerworld.com. Include an address and phone number for immediate verification.

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THIS WEEK

COMPENSATION CALMING

Gone are the days of head-spinning sign-on and retention bonuses and soaring salaries. According to *Computerworld*'s latest salary survey, IT is still a lucrative field with plenty of jobs and rising salaries, but instant millionaires are becoming a thing of the past . **PAGE 26**

GOING ONCE . . .

You can buy barely used PCs and routers from failed dot-coms at bargain-basement prices at auctions. But despite the savings, many IT managers steer clear of auctions. They're fine if you're shopping for noncritical equipment. But few IT managers are willing to trust mission-critical operations to equipment with an unknown past. **PAGE 34**

MANAGING CONTRACTORS

Perhaps the biggest victims of the economic downturn are third-party contractors. But, as they say, one man's loss is another's gain. Decreasing demand for contractors has lowered their prices. IT managers trying to get by on smaller budgets are leaning more heavily on in-house consultants and are negotiating better deals with the freelancers they do hire. **PAGE 36**

PAUL A. STRASSMANN

Diet? What Diet?

ONE OF CONSULTANTS' and academics' favorite assumptions about the effects of computers is that they help reduce the size of corporate assets. Computer applications, they claim, reduce inventories, accelerate revenue collection, promote better capacity utilization, increase the reliability of just-in-time ordering of parts and speed up work in process. If you sift through all of the claims that were made by proponents of "enterprise systems," most of the measurable benefits were always attributed to a dramatic decline in the value of corporate assets rather than reductions in labor costs.

Ever since the infatuation with enterprise systems fizzled because of excessive costs, those same promises were transplanted to various forms of interenterprise systems, such as the highly touted expectations of benefits from e-commerce.

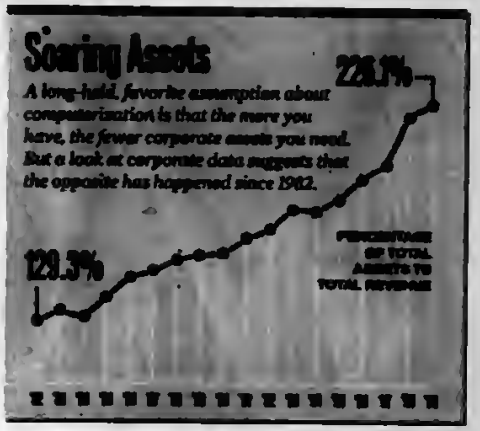
I've always been bothered by the persistence of the myth that computers are a surefire wonder diet to slim down corporate assets. But I had no way of independently verifying this claim. Anecdotal descriptions in computer magazines didn't help because they never delivered hard numbers, nor did they document what actually happened.

The latest compilation of more than 25,000 annual reports of every major, listed corporation in the world led me to study their latest financial data and share my findings with readers. My approach: Focus on the trends in the deployment of corporate assets during most of the past two decades, when companies were installing computers at a rapid rate. Corporations were placing the largest bets on the prospective payoffs from computers. When corporations invested in IT, asset reduction always led the parade of prospective tangible gains.

Here's evidence of what nearly two decades of exuberant spending has delivered.

I compared the amounts of **total corporate assets** needed to support each dollar of **corporate revenue**. If the hypothesis of computerization as an asset-saver were to hold up, then the percentage of **total assets to total revenue** would decline. Consistent historical data for assets and revenues was available for 1,848 randomly chosen U.S. corporations with total assets in 1999 of $16.6 trillion and total revenues of $7.4 trillion. This sample represents most of the total corporate assets (see chart).

The steady gain in the percentage of assets necessary to support revenues caused U.S. firms to require an additional $7.1 trillion in assets in 1999, 75% more than what worked for them in 1982.


Soaring Assets
A long-held, favorite assumption about computerization is that the more you have, the fewer corporate assets you need. But a look at corporate data suggests that the opposite has happened since 1982.
228.3%
129.3%
PERCENTAGE OF TOTAL ASSETS TO TOTAL REVENUE

To check whether the U.S. experience was unique, I also examined similar numbers for the U.K. and the Netherlands, which are noted for their good experiences in applying IT. But even in those countries, there has been a steady increase in the assets required to support each dollar in revenue.

Implications: The past two decades saw the installation of increasingly complex and costly information management systems that promised reductions in most asset accounts. After examining the data in audited financial statements, I can only conclude that the expected contributions of computers can't be verified in the numbers.

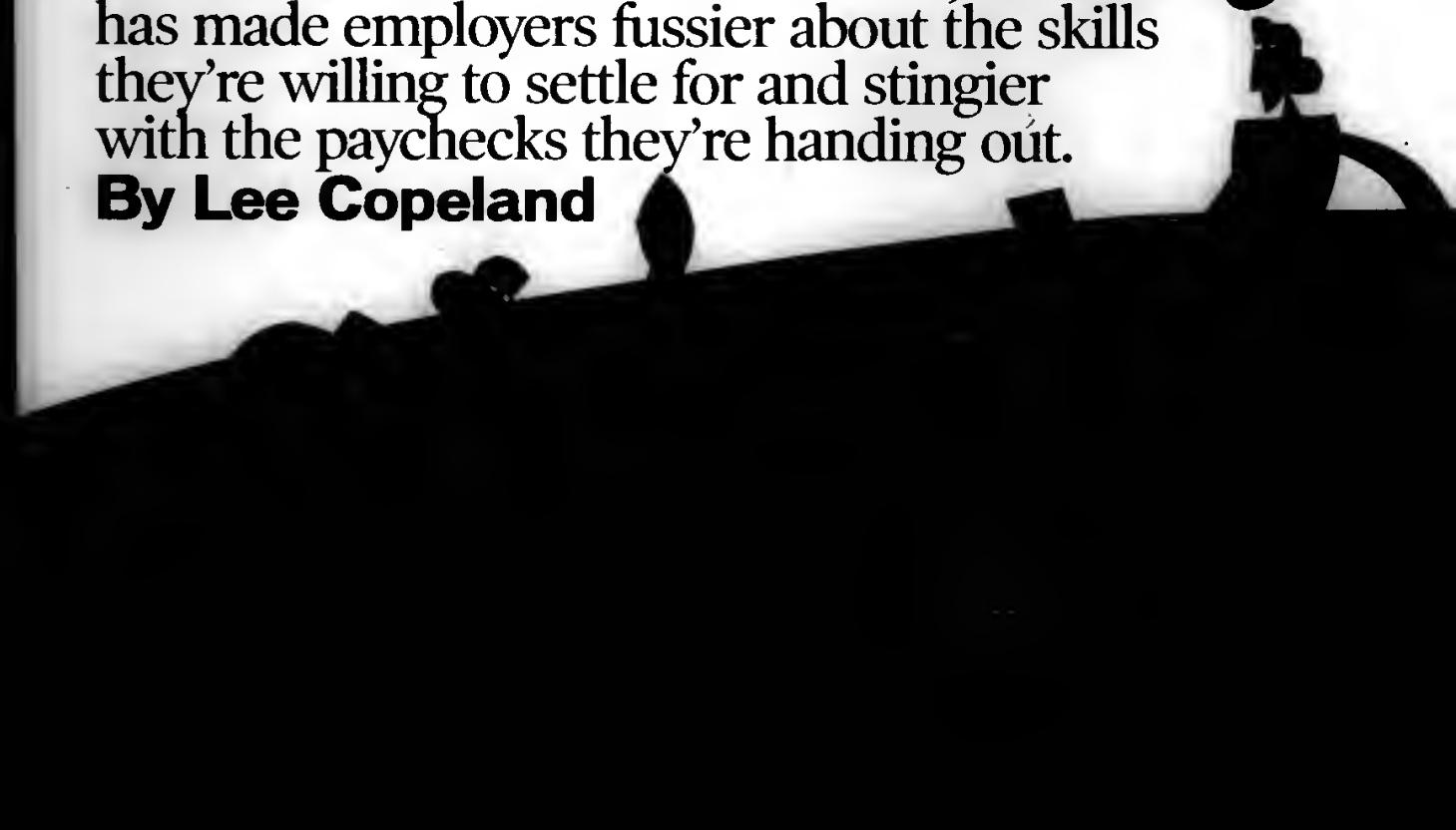
The percentage of total assets to total revenue is a most telling indicator that will help CIOs validate the effectiveness of their IT projects. Given the increased pressure on CIOs in today's slowing economy to justify and then track the payoffs from IT investments, this metric will offer highly credible proof of superior performance because it can be linked directly to financial statements. From now on, what counts is what benefits shareholders. The prescription for that: Create a trim organization that can compete with fewer assets to support rising revenue.

Strassmann will be publishing corporate-level details of trends in economic indicators in future issues. Contact him at paul@strassmann.com.

More FOR THE Money

The dramatic turnaround in the IT job market has made employers fussier about the skills they're willing to settle for and stingier with the paychecks they're handing out.

By Lee Copeland



AS THE LIST of fizzled start-ups grows, so does the pool of talented IT professionals in need of a new gig. But even in the midst of an economic downturn, corporations are still aggressively pursuing business objectives that have an emphasis on technology. And as a result, IT salaries are gaining a little ground this year.

Still, gone are exorbitant bonus plans. Say goodbye to wide-scale sign-on and retention bonuses, rapid hiring sprees and mushrooming baseline compensation. Instead, salary increases have been moderate this year — just less than 6% — and bonuses have been restricted to key members of the IT team.

Don't scoff too quickly. That 6% is still much higher than the raise received by the average American worker, who typically can expect a 4% wage increase each year. What accounts for the boost? A number of executives say they plan to do the hiring this year that would have busted their IT budgets last year.

COMPUTERWORLD'S 15th Annual SALARY SURVEY

Established Firm Seeks Senior . . .

Take, for example, Duke Energy Field Services LP. The $9 billion natural gas gathering company has been rapidly expanding its pipelines and gas wells, says Fred Kesinger, Duke's CIO of field services, and IT plays an integral part in managing that infrastructure. Consequently, Kesinger has quadrupled his IT staff this year, a task that was painfully difficult last year.

Duke faced a major recruiting and retention problem a year ago, which delayed the Denver-based company's efforts to rebuild its IT department.

"We were seeing a lot of requests in the $100,000 range — what we considered an unreasonable range," Kesinger recalls. "That impacted our ability to capture the best people, particularly in the Web development area. College interns were turning down competitive rates, with no experience, and presumably got jobs elsewhere for $20,000 more."

Rather than bringing in new full-time employees, Kesinger says, Duke relied on outsourcing its IT support.

"We continued to look at the situation and we had very serious discussions about bending to the market and paying those rates, and we elected not to do that because it would not be in sync with the rest of the [corporate] pay scale," he says.

With IT compensation no longer out of kilter, turnover rates are dropping, and companies that were running low on staff, such as Duke Energy Field Services, Gambro AB and Remy Corp., are now replenishing their departments.

All three firms — with offices in or near Denver — paid database managers $90,000 to $100,000 in baseline compensation to oversee database design, programming and maintenance, for example. Compensation increased approximately 6% over last year for that position at those companies, while bonuses either disappeared or accounted for about 9% of salaries this year.

And as firms beef up their staffs, IT executives expect that new hires will stick around longer instead of pursuing fatter paychecks elsewhere.

The IT turnover rate at Gambro, a $2.4 billion health care company, is the lowest in five years, says Joseph Fenn, manager of IT services, operations and infrastructure at the Stockholm-based company.

"Anyone could leave any job at any time and make $15,000 more a year ago," says Fenn. "There is still the opportunity for the best IT people to move, but not everyone. Only the top-rated people are finding work in this economy."

In contrast, most IT workers are looking to stay put this year. "There were way too many people making way too much money way too easily," says Andrew Albarelle, principal executive officer at Remy, a consulting firm in Denver. Albarelle says his employees were paid twice as much in salary just 12 months ago. On average, those salaried employees are making $120,000 this year, which has allowed Remy to hire 52 additional consultants.

And while top-rated workers may still find a steady paycheck and bonus this year, others aren't so fortunate.

To keep pace with the cash-laden and stock-option-wielding start-ups of years past, many corporations offered handsome bonus packages and nonmonetary incentives to retain their star employees. But this year, those perks are gone.

In the midst of the dot-com boom, Gambro's Lakewood, Colo.-based blood component division instituted a novel variable compensation program aimed at retaining valuable employees. Under the terms of that incentive program, employees could still earn their typical salaries and regularly scheduled annual bonuses of approximately 10% of base pay. In addition to that, however, employees could also earn what amounted to vested stock options.

Gambro devised the plan because it couldn't offer U.S. workers shares of its own stock. Gambro paid out the variable bonuses, which Fenn says were sizable, into a stock-index fund for those employees. Yet, like the stock-option plans at many start-ups, Gambro's variable bonuses paid out only after 36 months.

Salaries, page 28

Trends

A JOB WELL DONE

Efficiency is obviously its own reward since only 6% of total compensation nationally is based on individual job performance this year

BACK TO BASICS

When it comes to noncash compensation training is the top "perk," according to 70% of respondents, followed by the traditional 401(k) plan (55%) and comp time (46%)

WAIT UNTIL NEXT YEAR

Forget quarterly or biannual reviews. 80% of IT managers say they're conducting only annual salary reviews for their staff

THAT WAS THEN, THIS IS NOW

Signing bonuses and stock options are no longer the rage as 50% of companies have frozen them at previous levels, and 20% have eliminated them.

GOING FOR THE GOLD

The IT jobs expected to see the largest increase in pay in the next 12 months, according to IT managers, are network administrators (13%), Web developers (9%), database administrators (9%) and technical support personnel (8%).

ILLUSTRATION BY RICHARD LLEWELLYN

Job titles and descriptions surveyed

SENIOR MANAGEMENT

CIO/vice president of IS/IT: Top IS/IT executive for the organization, enterprisewide.

Chief technology officer: Responsible for technology direction in the organization.

Director of IS/IT/MIS: Top IS/IT/MIS executive for a business unit or division.

Director of systems development: Top systems development executive; directs systems management/applications programming (large-scale and desktop machines).

Director of networks: Top networking executive; manages voice/data communication.

Director, IS/IT operations: Top operations executive; directs the data center and systems operations group.

Internet technology strategist: Oversees integration of Web reporting, workflow, e-mail tracking, streaming media content, integration and security processes.

Web architect: Responsible for the development of customer applications for Internet development, maintaining Web servers and back-office infrastructure linkage.

MIDDLE MANAGEMENT

Manager of voice/data communications: Manages voice and data communications.

Manager of Internet/intranet technology: Manages all Internet- or intranet-related activities, including development, implementation and operations.

Project manager, systems and programming: Defines project system requirements and procedures to complete them.

Database manager: Directs the group that is responsible for database design programming and maintenance.

Computer operations manager: Manages computer systems, data processing and communications groups.

Technical support/help desk manager: Manages end-user hardware and/or software support.

STAFF AND ENTRY-LEVEL

Network administrator: Administers, defines, updates and maintains networks.

Information security specialist: Responsible for maintaining the security of computer systems, network applications and databases.

Senior systems analyst: Designs advanced system requirements to solve business problems.

Systems analyst/administrator: Analyzes business processes and designs basic system requirements.

Senior systems programmer: Responsible for system software, operating systems and related integration.

Systems programmer: Performs basic systems programmer tasks.

Senior programmer/analyst: Develops, tests and maintains advanced application programs for computer systems.

Programmer/analyst: Develops, tests and maintains basic application programs for computer systems.

Database analyst: Develops both physical and logical database functions.

Lead computer operator: Responsible for scheduling, processing, distributing and controlling the processing of information.

Computer operator: Responsible for daily processing and backing-up of information.

Technical specialist: Provides technical support for operating systems and monitors processing efficiencies.

Help desk operator: Answers support questions.

PC technical support specialist: Responsible for overall maintanance of PCs.

Webmaster: Responsible for the appearance, organization and content of a Web site, including how content is accessed and displayed, and the ease of navigation through site.

Web application developer: Responsible for programming Web site application code, page links and content links.

Continued from page 27

"It was a combination bonus and saving plan," Fenn explains. "If they left the company during the time frame, then it wasn't paid out."

But apparently the de facto stock-option plan overstayed its welcome. After three years, Gambro closed the program last year.

Still, Fenn says he believes the program helped to ease management's fears that its best performers would leave Gambro to purse stock-option packages at dot-com start-ups. "It was a very good program," Fenn says, but he doesn't expect a similar plan to take its place. "The market is not moving the way it was before, so employees are not moving," he says.

Other firms have also shelved or modified bonus plans.

"We're not giving out bonuses," reports Bharat Singh, director of business development at San Jose-based People.com Consultants Inc. "Bonuses were given to reward employees for jobs well done or for personal recognition, but our clients are clamping down on us for costs. We don't have the spare cash to give people bonuses."

IT managers at many companies are touting nonmonetary perks instead of cash bonuses and stock options.

"We did pay a few sign-on bonuses last year, but nothing too excessive," says Dave Reddish, network

TOTAL IT COMPENSATION (SALARY PLUS BONUSES) BY REGION

JOB TITLE	National Average	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
CIO/vice president of IT	$165,100	$178,100	$191,800	$158,500	$147,800	$158,300	$149,300	$159,800	$144,500	$201,800
Director of IT/IS/MIS	$108,300	$108,400	$114,800	$107,100	$98,100	$104,100	$102,100	$110,600	$99,900	$118,000
Project manager	$93,500	$103,400	$100,800	$94,300	$88,300	$94,800	$87,000	$93,600	$79,900	$99,700
Database manager	$84,800	$98,800	$98,100	$84,700	$70,800	$79,300	$79,200	$85,400	$78,400	$95,900
Senior systems analyst	$72,300	$75,800	$75,800	$74,600	$74,000	$69,800	$64,500	$73,400	$69,900	$76,200
Senior systems programmer	$66,900	$74,100	$70,000	$68,700	$68,500	$64,800	$67,200	$66,700	$65,100	$75,500
Web application developer	$61,700	$60,500	$59,800	$54,800	$58,300	$58,000	$58,500	$60,100	$55,600	$66,800
Network administrator	$60,600	$65,400	$62,300	$57,600	$57,500	$57,200	$49,000	$57,000	$54,050	$63,100
Programmer/analyst	$55,100	$60,700	$59,400	$51,500	$52,400	$54,500	$51,300	$57,700	$48,500	$61,600
Help desk operator	$39,700	$39,000	$39,200	$38,700	$38,000	$44,400	$37,000	$37,600	$38,500	$43,900

* REGIONS ARE AS FOLLOWS: NEW ENGLAND = MAINE, VERMONT, NEW HAMPSHIRE, MASSACHUSETTS, CONNECTICUT, RHODE ISLAND; MIDDLE ATLANTIC = NEW YORK, NEW JERSEY, PENNSYLVANIA; SOUTH ATLANTIC = DELAWARE, DISTRICT OF COLUMBIA, MARYLAND, VIRGINIA, WEST VIRGINIA, NORTH CAROLINA, SOUTH CAROLINA, GEORGIA, FLORIDA, PUERTO RICO, U.S. VIRGIN ISLANDS; EAST NORTH CENTRAL = WISCONSIN, MICHIGAN, ILLINOIS, INDIANA, OHIO; EAST SOUTH CENTRAL = KENTUCKY, TENNESSEE, MISSISSIPPI, ALABAMA; WEST NORTH CENTRAL = NORTH DAKOTA, SOUTH DAKOTA, MINNESOTA, NEBRASKA, IOWA, KANSAS, MISSOURI; WEST SOUTH CENTRAL = OKLAHOMA, ARKANSAS, LOUISIANA, TEXAS; MOUNTAIN = IDAHO, MONTANA, WYOMING, NEVADA, UTAH, COLORADO, ARIZONA, NEW MEXICO; PACIFIC = ALASKA, WASHINGTON, OREGON, CALIFORNIA, HAWAII, GUAM

SENIOR MANAGEMENT

CIO/vice president of IS/IT

Average salary
$130,441
Bonus
$34,671
Total
$165,112

Chief technology officer

Average salary
$123,509
Bonus
$31,593
Total
$155,102

Director of IS/IT

Average salary
$92,954
Bonus
$15,292
Total
$108,246

Director of systems development

Average salary
$106,933
Bonus
$15,840
Total
$122,773

Director of networks

Average salary
$91,201
Bonus
$15,075
Total
$106,276

Director of IS/IT operations

Average salary
$92,330
Bonus
$14,267
Total
$106,597

Internet technology strategist

Average salary
$89,787
Bonus
$13,092
Total
$102,889

Web architect

Average salary
$75,018
Bonus
$10,370
Total
$85,388

MIDDLE MANAGEMENT

Manager of voice/data communications

Average salary
$75,034
Bonus
$8,181
Total
$83,215

Manager of Internet/intranet technology

Average salary
$85,321
Bonus
$8,485
Total
$93,806

A SAMPLING OF INDUSTRIES BY PAY (TOTAL COMPENSATION)

Business services, IT **$174,250**	Financial services **$160,125**	Financial services **$116,800**	Health care **$179,225**	Financial services **$112,000**	Financial services **$122,429**	Financial services **$140,833**	Financial services **$87,500**	Financial services **$96,400**	Financial services **$126,091**
Insurance **$153,000**	Business services, IT **$141,125**	Business services, IT **$102,133**	Financial services **$133,950**	Insurance **$106,000**	Business services, IT **$103,636**	Insurance **$110,000**	Telecommunications **$86,500**	Insurance **$82,500**	Insurance **$90,000**
Financial services **$152,125**	Media **$130,000**	Telecommunications **$98,429**	Computer hardware **$110,857**	Business services, IT **$95,000**	Insurance **$99,167**	Business services, IT **$97,500**	Computer hardware **$85,000**	Health care **$78,250**	Business services, IT **$84,667**
Retail **$143,286**	Computer hardware **$109,571**	Wholesale/distribution **$93,889**	Business services, IT **$106,643**	Media **$86,520**	Retail **$94,800**	Media **$75,400**	Government **$84,786**	Computer hardware **$77,500**	Government **$74,076**
Media **$139,375**	Government **$95,169**	Health care **$93,405**	Insurance **$106,400**	Government **$85,785**	Computer hardware **$90,000**	Government **$71,006**	Insurance **$83,833**	Business services, IT **$75,714**	Education **$72,200**
Business services **$137,250**	Business services **$77,250**	Business services **$89,750**	Wholesale/distribution **$101,759**	Health care **$85,125**	Health care **$87,750**	Education **$51,333**	Business services, IT **$80,577**	Metal/plastics **$70,615**	Retail **$71,750**
Petroleum production **$136,750**	Education **$74,556**	Electrical equipment **$89,203**	Telecommunications **$95,357**	Education **$83,438**	Business services **$87,600**		Media **$72,750**	Telecommunications **$70,200**	Wholesale/distribution **$69,250**
Telecommunications **$129,750**		Food/beverages **$85,475**	Government **$85,717**	Apparel/textile **$82,833**	Government **$82,036**		Business services **$62,625**	Government **$68,811**	
Health care **$120,306**		Metal/plastics **$84,896**	Media **$85,167**	Computer hardware **$82,000**	Education **$76,750**		Education **$48,900**	Business services **$67,625**	
Wholesale/distribution **$120,000**		Government **$84,682**	Education **$76,731**		Media **$70,833**			Education **$54,132**	

AVERAGE TOTAL COMPENSATION BY COMPANY SIZE (COMPANIES RANKED BY REVENUE)

Less than $10M **$109,467**	Less than $10M **$107,393**	Less than $10M **$74,630**	Less than $10M **$80,917**	Less than $10M **$84,143**	Less than $10M **$85,533**	Less than $10M **$81,333**	Less than $10M **$49,000**	Less than $10M **$68,929**	Less than $10M **$67,250**
$10M to $99.9M **$136,294**	$10M to $99.9M **$138,731**	$10M to $99.9M **$91,240**	$10M to $99.9M **$105,808**	$10M to $99.9M **$96,667**	$10M to $99.9M **$94,367**	$10M to $99.9M **$93,666**	$10M to $99.9M **$78,800**	$10M to $99.9M **$77,250**	$10M to $99.9M **$82,909**
$100M to $499.9M **$157,333**	$100M to $499.9M **$135,068**	$100M to $499.9M **$117,960**	$100M to $499.9M **$133,349**	$100M to $499.9M **$98,185**	$100M to $499.9M **$98,727**	$100M to $499.9M **$90,678**	$100M to $499.9M **$80,008**	$100M to $499.9M **$75,476**	$100M to $499.9M **$81,513**
$500M to $999.9M **$179,750**	$500M to $999.9M **$143,875**	$500M to $999.9M **$122,821**	$500M to $999.9M **$131,012**	$500M to $999.9M **$107,206**	$500M to $999.9M **$107,571**	$500M to $999.9M **$104,500**	$500M to $999.9M **$88,188**	$500M to $999.9M **$84,106**	$500M to $999.9M **$88,864**
$1B to $4.9B **$260,974**	$1B to $4.9B **$207,778**	$1B to $4.9B **$138,350**	$1B to $4.9B **$123,675**	$1B to $4.9B **$113,528**	$1B to $4.9B **$117,945**	$1B to $4.9B **$123,083**	$1B to $4.9B **$91,233**	$1B to $4.9B **$81,378**	$1B to $4.9B **$87,133**
$5B to $10B **$259,909**		$5B to $10B **$118,571**	$5B to $10B **$175,000**	$5B to $10B **$153,000**	$5B to $10B **$127,500**		$5B to $10B **$97,900**	$5B to $10B **$96,500**	$5B to $10B **$87,625**
	$10B or more **$213,000**	$10B or more **$127,895**	$10B or more **$146,077**	$10B or more **$141,095**	$10B or more **$146,067**	$10B or more **$140,091**	$10B or more **$108,000**	$10B or more **$104,895**	$10B or more **$128,424**

operations manager at the University of Massachusetts Boston. "Now, we're less likely to pay sign-on bonuses. With the downturn in the market, people are prepared to take more secure jobs, even with slightly less salary."

Instead, the University of Massachusetts medical school is emphasizing other assets, such as quality benefits, moderate bonuses of 5% per year and job security.

"The one downside for the university is that it's not the most prestigious place to work. It's not a sexy, creative company," says Reddish.

But the educational institution offers six weeks of paid vacation per year and tuition waivers to employees and their children. Each IT staffer can get a bonus of 5% of his annual pay at Christmas time, which UMass matches six months later as a salary increase.

COMPUTERWORLD'S 15th Annual SALARY SURVEY

But while IT managers aren't doling out bonuses like candy on Halloween, they're still offering treats to their top staffers.

"It's the distribution of bonuses that has changed," says David Foote, managing partner at Foote Partners LLC in New Canaan, Conn. "Companies are still paying more bonuses to established players, but they're taking them away from junior people."

Duke's Kesinger concurs, "We've done some selective retention bonuses, but they were key resources that we could not replace," he says.

Workers with specialized skills in areas such as security technology or an archaic development language that's integral to a corporation's IT resources will continue to receive handsome bonuses during the current economic downturn, Foote adds.

Another outcome of the economic downturn is an increased emphasis on probationary periods for new hires. A number of IT managers, particularly among consulting firms, told *Computerworld* that they got caught up in the hiring frenzy during the dot-com boom — and got burned.

People.com now asks potential employees for a few days of free consulting services — something the company didn't do last year. It's a blatant attempt to ensure that potential employees possess the technical and people skills for success, says Singh.

Singh says ambitious but unseasoned IT recruits won't get the same range of opportunities this year. Two years ago, "consultants with little experience could mature way ahead of time," he says. "Junior to midlevel people were commanding salaries of $90,000 and up. Now they're getting $50,000 to $70,000, and only senior-level people are getting

Salaries, page 32

Trends

A JOB WELL DONE

Efficiency is obviously its own reward since only 6% of total compensation nationally is based on individual job performance this year.

BACK TO BASICS

When it comes to noncash compensation, training is the top "perk," according to 70% of respondents, followed by the traditional 401(k) plan (55%) and comp time (46%).

WAIT UNTIL NEXT YEAR

Forget quarterly or biannual reviews; 80% of IT managers say they're conducting only annual salary reviews for their staff.

THAT WAS THEN, THIS IS NOW

Signing bonuses and stock options are no longer the rage, as 50% of companies have frozen them at previous levels, and 20% have eliminated them.

GOING FOR THE GOLD

The IT jobs expected to see the largest increase in pay in the next 12 months, according to IT managers, are network administrators (13%), Web developers (9%), database administrators (9%) and technical support personnel (8%).

ILLUSTRATION BY RICHARD ULLARH

Job titles and descriptions surveyed

SENIOR MANAGEMENT

CIO/vice president of IS/IT: Top IS/IT executive for the organization, enterprisewide.

Chief technology officer: Responsible for technology direction in the organization.

Director of IS/IT/MIS: Top IS/IT/MIS executive for a business unit or division.

Director of systems development: Top systems development executive; directs systems management/applications programming (large-scale and desktop machines).

Director of networks: Top networking executive; manages voice/data communication.

Director, IS/IT operations: Top operations executive; directs the data center and systems operations group.

Internet technology strategist: Oversees integration of Web reporting, workflow, e-mail tracking, streaming media content, integration and security processes.

Web architect: Responsible for the development of customer applications for Internet development, maintaining Web servers and back-office infrastructure linkage.

MIDDLE MANAGEMENT

Manager of voice/data communications: Manages voice and data communications.

Manager of Internet/intranet technology: Manages all Internet- or intranet-related activities, including development, implementation and operations.

Project manager, systems and programming: Defines project system requirements and procedures to complete them.

Database manager: Directs the group that is responsible for database design, programming and maintenance.

Computer operations manager: Manages computer systems, data processing and communications groups.

Technical support/help desk manager: Manages end-user hardware and/or software support.

STAFF AND ENTRY-LEVEL

Network administrator: Administers, defines, updates and maintains networks.

Information security specialist: Responsible for maintaining the security of computer systems, network applications and databases.

Senior systems analyst: Designs advanced system requirements to solve business problems.

Systems analyst/administrator: Analyzes business processes and designs basic system requirements.

Senior systems programmer: Responsible for system software, operating systems and related integration.

Systems programmer: Performs basic systems programmer tasks.

Senior programmer/analyst: Develops, tests and maintains advanced application programs for computer systems.

Programmer/analyst: Develops, tests and maintains basic application programs for computer systems.

Database analyst: Develops both physical and logical database functions.

Lead computer operator: Responsible for scheduling, processing, distributing and controlling the processing of information.

Computer operator: Responsible for daily processing and backing-up of information.

Technical specialist: Provides technical support for operating systems and monitors processing efficiencies.

Help desk operator: Answers support questions.

PC technical support specialist: Responsible for overall maintenance of PCs.

Webmaster: Responsible for the appearance, organization and content of a Web site, including how content is accessed and displayed, and the ease of navigation through site.

Web application developer: Responsible for programming Web site application code, page links and content links.

Continued from page 27

"It was a combination bonus and saving plan," Fenn explains. "If they left the company during the time frame, then it wasn't paid out."

But apparently the de facto stock-option plan overstayed its welcome. After three years, Gambro closed the program last year.

Still, Fenn says he believes the program helped to ease management's fears that its best performers would leave Gambro to purse stock-option packages at dot-com start-ups. "It was a very good program," Fenn says, but he doesn't expect a similar plan to take its place. "The market is not moving the way it was before, so employees are not moving," he says.

Other firms have also shelved or modified bonus plans.

"We're not giving out bonuses," reports Bharat Singh, director of business development at San Jose-based People.com Consultants Inc. "Bonuses were given to reward employees for jobs well done or for personal recognition, but our clients are clamping down on us for costs. We don't have the spare cash to give people bonuses."

IT managers at many companies are touting nonmonetary perks instead of cash bonuses and stock options.

"We did pay a few sign-on bonuses last year, but nothing too excessive," says Dave Reddish, network

TOTAL IT COMPENSATION: SALARY PLUS BONUSES | BY REGION

JOB TITLE										
CIO/vice president of IT										
Director of IT/IS/MIS										
Project manager										
Database manager										
Senior systems analyst										
Senior systems programmer										
Web application developer										
Network administrator										
Programmer/analyst										
Help desk operator										

● REGIONS ARE AS FOLLOWS: NEW ENGLAND = MAINE, VERMONT, NEW HAMPSHIRE, MASSACHUSETTS, CONNECTICUT, RHODE ISLAND. MIDDLE ATLANTIC = NEW YORK, NEW JERSEY, PENNSYLVANIA. SOUTH ATLANTIC = DELAWARE, DISTRICT OF COLUMBIA, MARYLAND, VIRGINIA, WEST VIRGINIA, NORTH CAROLINA, SOUTH CAROLINA, GEORGIA, FLORIDA, PUERTO RICO, U.S. VIRGIN ISLANDS. EAST NORTH CENTRAL = WISCONSIN, MICHIGAN, ILLINOIS, INDIANA, OHIO. EAST SOUTH CENTRAL = KENTUCKY, TENNESSEE, MISSISSIPPI, ALABAMA. WEST NORTH CENTRAL = NORTH DAKOTA, SOUTH DAKOTA, MINNESOTA, NEBRASKA, IOWA, KANSAS, MISSOURI. WEST SOUTH CENTRAL = OKLAHOMA, ARKANSAS, LOUISIANA, TEXAS. MOUNTAIN = IDAHO, MONTANA, WYOMING, NEVADA, UTAH, COLORADO, ARIZONA, NEW MEXICO. PACIFIC = ALASKA, WASHINGTON, OREGON, CALIFORNIA, HAWAII, GUAM.

SENIOR MANAGEMENT								MIDDLE MANAGEMENT	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Manager of voice/data communications	Manager of Internet/intranet technology
Average salary	Average salary	Average salary	Average salary	Average salary	Average salary	Average salary	Average salary	Average salary	Average salary
$130,441	$123,509	$92,654	$106,663	$91,801	$92,250	$98,767	$75,018	$75,034	$85,321
Bonus	Bonus	Bonus	Bonus	Bonus	Bonus	Bonus	Bonus	Bonus	Bonus
$34,671	$31,893	$10,992	$12,840	$12,078	$14,257	$12,092	$10,270	$8,181	$8,485
Total	Total	Total	Total	Total	Total	Total	Total	Total	Total
$165,112	$155,402	$103,646	$119,779	$103,879	$106,507	$110,859	$85,288	$83,215	$93,806
A SAMPLING OF INDUSTRIES BY PAY (TOTAL COMPENSATION)									
Business services, IT	Financial services	Financial services	Health care	Financial services	Financial services	Financial services	Financial services	Financial services	Financial services
$174,250	$160,165	$119,300	$179,225	$118,000	$122,500	$140,536	$97,800	$96,400	$126,001
Insurance	Business services, IT	Business services, IT	Financial services	Insurance	Business services, IT	Insurance	Telecommunications	Insurance	Insurance
$163,900	$141,595	$102,165	$135,000	$103,800	$108,500	$110,000	$93,800	$82,500	$90,000
Financial services	Media	Telecommunications	Computer hardware	Business services, IT	Insurance	Business services, IT	Computer hardware	Health care	Business services, IT
$152,165	$130,000	$96,429	$110,557	$96,000	$89,157	$97,800	$86,000	$78,250	$84,667
Retail	Computer hardware	Wholesale/distribution	Business services, IT	Media	Retail	Media	Government	Computer hardware	Government
$143,398	$108,571	$93,600	$109,500	$90,500	$84,000	$75,400	$84,788	$77,500	$74,076
Media	Government	Health care	Insurance	Government	Computer hardware	Government	Insurance	Business services, IT	Education
$139,275	$95,160	$92,400	$107,000	Education	Government	$71,008	$83,600	$75,714	$72,200
Business services	Business services	Business services	Wholesale/distribution	Computer hardware	Media	Education	Business services, IT	Metal/plastics	Retail
$137,250	$77,250	$89,750	$100,000	Government	Education	$69,333	$80,577	$70,815	$71,750
Petroleum production	Education	Electrical equipment	Media	Business services	Business services	Business services	Media	Telecommunications	Wholesale/distribution
$136,750	$76,896	$88,500	$98,000	$85,400	$80,000	Computer hardware	$72,750	$70,200	$69,250
Telecommunications		Food/beverages	Retail	Retail	Media	Retail	Business services	Government	
$128,750		$86,475	$97,777	Computer hardware	Retail	Wholesale/distribution	$62,625	$66,811	
Health care		Metal/plastics	Utility	Wholesale/distribution	Wholesale/distribution	Metal/plastics	Education	Business services	
$120,308		$84,500	$95,167	$80,000	$75,000	$60,000	$60,000	$67,625	
Wholesale/distribution		Government	Education					Education	
$120,000		$84,552	$94,000					$54,132	
AVERAGE TOTAL COMPENSATION BY COMPANY SIZE (INDUSTRIES RANKED BY REVENUE)									
Less than $10M	Less than $10M	Less than $10M	Less than $10M	Less than $10M	Less than $10M	$10M to $99.9M	Less than $10M	Less than $10M	Less than $10M
$108,467	$107,269	$76,630	$89,917	$84,353	$88,333	$81,263	$48,000	$66,929	$87,250
$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$100M to $499.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M
$136,364	$135,791	$91,540	$105,556	$99,627	$94,977	$98,000	$70,200	$77,250	$82,000
$100M to $499.9M	$100M to $499.9M	$100M to $499.9M	$10M to $499.9M	$100M to $499.9M	$100M to $499.9M	$500M to $999.9M	$100M to $499.9M	$100M to $499.9M	$100M to $499.9M
$157,200	$155,000	$117,000	$99,000	$99,000	$98,727	$90,000	$90,000	$75,476	$81,513
$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$1B to $4.9B	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M
$178,750	$148,575	$102,821	$101,062	$107,000	$107,571	$104,200	$90,150	$84,106	$88,864
$1B to $4.9B	$1B to $4.9B	$1B to $4.9B	$1B to $4.9B	$1B to $4.9B	$1B to $4.9B	$5B to $9.9B	$1B to $4.9B	$1B to $4.9B	$1B to $4.9B
$200,974	$207,778	$109,269	$108,076	$113,889	$117,945	$122,083	$91,233	$91,378	$87,133
$5B to $9B		$5B to $9B	$5B to $9B	$5B to $9B	$5B to $9B		$5B to $9B	$5B to $9B	$5B to $9B
$209,000		$110,571	$119,000	$122,000	$127,000		$97,800	$96,500	$87,625
	$10B or more	$10B or more	$10B or more	$10B or more	$10B or more	$10B or more	$10B or more	$10B or more	$10B or more
	$218,000	$127,895	$140,077	$141,895	$140,067	$140,091	$108,000	$104,895	$126,424

operations manager at the University of Massachusetts Boston. "Now, we're less likely to pay sign-on bonuses. With the downturn in the market, people are prepared to take more secure jobs, even with slightly less salary."

Instead, the University of Massachusetts medical school is emphasizing other assets, such as quality benefits, moderate bonuses of 5% per year and job security.

"The one downside for the university is that it's not the most prestigious place to work. It's not a sexy, creative company," says Reddish.

But the educational institution offers six weeks of paid vacation per year and tuition waivers to employees and their children. Each IT staffer can get a bonus of 5% of his annual pay at Christmas time, which UMass matches six months later as a salary increase.

But while IT managers aren't doling out bonuses like candy on Halloween, they're still offering treats to their top staffers.

"It's the distribution of bonuses that has changed," says David Foote, managing partner at Foote Partners LLC in New Canaan, Conn. "Companies are still paying more bonuses to established players, but they're taking them away from junior people."

Duke's Kesinger concurs, "We've done some selective retention bonuses, but they were key resources that we could not replace," he says.

Workers with specialized skills in areas such as security technology or an archaic development language that's integral to a corporation's IT resources will continue to receive handsome bonuses during the current economic downturn, Foote adds.

Another outcome of the economic downturn is an increased emphasis on probationary periods for new hires. A number of IT managers, particularly among consulting firms, told *Computerworld* that they got caught up in the hiring frenzy during the dot-com boom — and got burned.

People.com now asks potential employees for a few days of free consulting services — something the company didn't do last year. It's a blatant attempt to ensure that potential employees possess the technical and people skills for success, says Singh.

Singh says ambitious but unseasoned IT recruits won't get the same range of opportunities this year. Two years ago, "consultants with little experience could mature way ahead of time," he says. "Junior to midlevel people were commanding salaries of $90,000 and up. Now they're getting $50,000 to $70,000, and only senior-level people are getting

Salaries, page 32

Let's hear it for the 1928 nickel and its 49,000% R.O.I.

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R.O.I.

RETURN ON INVESTMENT OR REALLY OUTSTANDING INFRASTRUCTURE?

BUSINESS. It's all about return on investment. Think about it. There's a finite amount of money available. If it runs out, game over. And if you make a sizable IT investment in your company, you'll want to see a return.

But where's the "sweet spot"? What's the optimal investment? Under invest and you run the risk that your infrastructure (the hardware, software and services underlying your business) won't be able to manage demand. Over invest and you waste capital. Wads of it. You need help striking that magic balance and finding the optimal investment to help your business prosper.

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MIDDLE MANAGEMENT

Project manager, systems and programming	Database manager	Computer operations manager	Technical support/help desk manager
Average salary	Average salary	Average salary	Average salary
$79,263	$77,573	$68,122	$62,987
Bonus	Bonus	Bonus	Bonus
$6,937	$7,197	$5,990	$6,485
Total	Total	Total	Total
$86,200	$84,770	$74,112	$69,472

STAFF AND ENTRY-LEVEL

Network administrator	Information security specialist	Senior systems analyst	Systems analyst/ administrator	Senior systems programmer	Systems programmer
Average salary	Average salary	Average salary	Average salary	Average salary	Average salary
$55,186	$60,033	$66,457	$59,942	$64,593	$57,021
Bonus	Bonus	Bonus	Bonus	Bonus	Bonus
$4,847	$4,476	$5,854	$3,896	$4,285	$2,637
Total	Total	Total	Total	Total	Total
$60,033	$64,509	$72,311	$62,838	$68,878	$59,658

A SAMPLING OF INDUSTRIES BY PAY (TOTAL COMPENSATION)

Financial services	Financial services	Financial services	Financial services	Insurance	Business services, IT	Business services, IT	Business services, IT	Transportation	Health care
$96,436	$100,889	$85,906	$75,231	$66,250	$66,776	$81,231	$64,727	$72,750	$66,500
Computer hardware	Insurance	Chemical products	Computer hardware	Business services, IT	Insurance	Chemical products	Computer hardware	Computer hardware	Financial services
$86,100	$90,000	$78,250	$72,500	$65,250	$63,000	$78,875	$62,500	$72,857	$60,800
Insurance	Business services, IT	Petroleum	Government	Utilities	Financial services	Financial services	Financial services	Health care	Business services, IT
$85,929	$85,467	$77,500	$63,400	$65,000	$62,444	$73,833	$61,556	$71,375	$60,668
Wholesale/distribution	Retail	Business services	Health care	Telecommunications	Health care	Transportation	Wholesale/distribution	Financial services	Computer hardware
$84,000	$81,500	$71,575	$62,963	$62,833	$60,000	$71,600	$59,500	$71,192	$56,167
Retail	Health care	Business services, IT	Business services, IT	Business services	Petroleum	Computer hardware	Government	Telecommunications	Media
$83,833	$80,286	$71,429	$61,500	$60,800	$58,250	$71,600	$57,410	$70,667	$54,000
Utilities	Wholesale/distribution	Government	Telecommunications	Financial services	Government	Petroleum	Business services	Business services, IT	Government
$83,750	$76,250	$67,038	$60,333	$60,000	$58,134	$71,250	$56,500	$67,375	$50,166
Business services, IT	Media	Transportation	Business services	Petroleum	Education	Insurance	Health care	IT VARs	Education
$83,706	$77,375	$66,500	$60,050	$56,250	$50,000	$66,250	$55,292	$62,500	$49,936
Transportation	Telecommunications	Wholesale/distribution	Transportation	Computer hardware		Utilities	Education	Automotive	
$81,360	$73,250	$65,857	$59,625	$57,500		$65,333	$54,645	$61,250	
Wood/paper	Computer hardware	Metal/plastics	Media	Transportation		Business services	IT VARs	Business services	
$80,500	$71,800	$65,770	$59,111	$57,143		$64,200	$54,500	$60,500	
Health care	Government	Health care	Retail	Health care		Wholesale/distribution	Media	Government	
$78,409	$69,395	$64,778	$50,250	$56,891		$63,750	$49,250	$56,676	

AVERAGE TOTAL COMPENSATION BY COMPANY SIZE (COMPANIES RANKED BY REVENUE)

Less than $10M	Less than $10M	Less than $10M	Less than $10M	Less than $10M	Less than $10M	Less than $10M	Less than $10M	Less than $10M	Less than $10M
$77,750	$69,912	$66,050	$60,472	$56,993	$54,300	$77,429	$56,556	$61,875	$52,506
$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M
$84,643	$79,000	$68,569	$64,184	$55,953	$72,344	$67,451	$60,332	$69,444	$56,506
$100M to $499.9M	$100M to $499.9M	$100M to $499.9M	$100M to $499.9M	$100M to $499.9M	$100M to $499.9M	$100M to $499.9M	$100M to $499.9M	$100M to $499.9M	$100M to $499.9M
$84,124	$80,564	$66,061	$66,534	$61,416	$57,777	$71,010	$63,195	$69,364	$60,464
$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M
$87,858	$90,441	$86,020	$69,595	$64,559	$66,650	$69,447	$65,450	$67,000	$65,333
$1B to $4.9B	$1B to $4.9B	$1B to $4.9B	$1B to $4.9B	$1B to $4.9B	$1B to $4.9B	$1B to $4.9B	$1B to $4.9B	$1B to $4.9B	$1B to $4.9B
$90,326	$94,800	$71,673	$71,762	$64,678	$63,469	$71,536	$58,226	$69,506	$59,585
$5B to $10B	$5B to $10B	$5B to $10B	$5B to $10B	$5B to $10B	$5B to $10B	$5B to $10B	$5B to $10B	$5B to $10B	$5B to $10B
$88,722	$80,800	$87,766	$74,900	$60,167	$65,356	$70,833	$59,667	$68,714	$62,567
$10B or more	$10B or more	$10B or more	$10B or more	$10B or more	$10B or more	$10B or more	$10B or more	$10B or more	$10B or more
$104,204	$102,469	$104,706	$94,400	$68,169	$72,625	$62,357	$65,267	$70,794	$65,731

Continued from page 29

$70,000 and up."

IT managers aren't lamenting the loss of the dot-com hiring frenzy.

"Just because we have everybody's money, doesn't mean that we're quick to give it away," says Monte James, assistant vice president of network services at Bank of Oklahoma NA in Tulsa, Okla. In general, budgets are tighter, according to James, and as a consequence, the bank is now a lot more selective about its IT projects and new hires.

"We need to justify to management what we're doing," says James. "It was less difficult to get sign-off last year."

"This is how it should have been," says Remy's Albarelle. "Demand was so high, but the supply was low, so you had to lower the bar. Now we're only looking at candidates that have 11 of the 10 things that we're looking for."

Both Albarelle and Singh say compensation for consultants has dropped by as much as 50% over last year. Instead of renting staff for lengthy projects, Remy's clients are now looking for permanent placements. "It's a good opportunity for consultants to get off-road and find a permanent home," says Albarelle.

COMPUTERWORLD'S 15th Annual SALARY SURVEY

Prodigals Return

Even IT executives who watched their turnover rates soar during the dot-com boom say it's their practice not to burn bridges.

"We had a couple of people that left to work at dot-coms," says Kesinger. "But both came back after six months, asking for their old jobs back. Not everything was as they had been told, and there were some overexpectations. Then there were layoffs."

James says that just because a former employee looked for a better compensation package and career opportunities elsewhere, that doesn't necessarily reflect poorly on that individual.

"I always tell them to stay in touch," says James. "If there were performance issues, we wouldn't take them back. But if it's a star performer, we'll definitely take them back."

Methodology

Computerworld's 15th Annual Salary Survey was mailed to IT executives across the U.S. in May and June. IT executives (522 in total) responded to our survey, providing information about annual salaries, the changes in salary levels from the same period in 2000 and the additional compensation for 23 IT senior management, middle management and staff and entry-level positions.

BUSINESSSALARY SURVEY

STAFF AND ENTRY-LEVEL

Senior programmer/ analyst	Programmer/ analyst	Database analyst	Lead computer operator	Computer operator	Technical specialist	Help desk operator	PC technical support specialist	Webmaster	Web application developer
Average salary	Average salary	Average salary	Average salary	Average salary	Average salary	Average salary	Average salary	Average salary	Average salary
$63,713	$52,347	$63,132	$40,466	$33,793	$45,220	$37,260	$41,425	$56,841	$56,414
Bonus	Bonus	Bonus	Bonus	Bonus	Bonus	Bonus	Bonus	Bonus	Bonus
$4,073	$2,791	$3,909	$2,114	$1,663	$2,837	$2,333	$1,996	$3,403	$3,282
Total	Total	Total	Total	Total	Total	Total	Total	Total	Total
$67,786	$55,138	$67,041	$42,602	$35,476	$48,057	$39,713	$43,420	$60,244	$61,696

A SAMPLING OF INDUSTRIES BY PAY (TOTAL COMPENSATION)

Computer hardware	Business services, IT	Transportation	Business services, IT	Business services, IT	Telecommunications	Business services, IT	IT VARs	Financial services	Media
$73,833	$63,077	$71,600	$55,900	$48,200	$55,000	$43,200	$54,000	$65,909	$73,750
Business services, IT	Financial services	Business services	Financial services	Financial services	Business services, IT	Wholesale/distribution	Computer hardware	Health care	Financial services
$72,125	$60,963	$71,100	$42,654	$35,571	$52,900	$40,250	$48,100	$63,200	$66,200
Financial services	Chemical products	Financial services	Government	Petroleum	Financial services	Media	Utilities	Business services, IT	Health care
$71,261	$54,750	$68,909	$40,570	$35,200	$48,042	$40,200	$47,000	$64,444	$65,500
Business services	Media	Business services IT	Health care	Government	Computer hardware	IT VARs	Transportation	Media	Business services, IT
$66,750	$54,667	$67,365	$40,511	$35,167	$48,750	$39,750	$46,150	$62,500	$63,364
IT VARs	Computer hardware	Education	Wholesale/distribution	Food/beverages	Health care	Financial services	Telecommunications	Wholesale/distribution	Education
$65,600	$54,375	$65,563	$35,800	$34,750	$43,714	$39,731	$45,400	$60,000	$61,750
Retail	IT VARs	Telecommunications	Insurance	IT VARs	Government	Computer hardware	Business services, IT	Telecommunications	Insurance
$64,400	$54,000	$63,750	$35,000	$32,250	$43,480	$38,813	$43,455	$58,750	$61,250
Food/beverages	Telecommunications	Media	Education	Education	Retail	Telecommunications	Financial services	IT VARs	IT VARs
$62,600	$54,000	$62,600	$34,965	$31,268	$42,400	$38,600	$42,579	$57,500	$57,000
Media	Transportation	Health care		Wholesale/distribution	Media	Business services	Industrial equipment	Government	Telecommunications
$62,600	$53,740	$62,073		$30,667	$40,888	$38,400	$42,500	$61,274	$60,000
Automotive	Automotive	Wholesale/distribution		Insurance	Education	Transportation	Construction	Computer hardware	Retail
$61,500	$52,500	$59,600		$30,500	$31,267	$38,875	$42,000	$61,250	$63,900
Health care	Food/beverages	Government		Retail		Health care	Wholesale/distribution	Education	Government
$61,182	$52,125	$54,579		$28,280		$35,636	$41,750	$43,000	$48,238

AVERAGE TOTAL COMPENSATION BY COMPANY SIZE (COMPANIES RANKED BY REVENUE)

Less than $10M	Less than $10M	Less than $10M	Less than $10M	Less than $10M	Less than $10M	Less than $10M	Less than $10M	Less than $10M	Less than $10M
$63,063	$63,750	$55,222	$40,496	$31,921	$39,000	$38,111	$41,536	$56,567	$64,667
$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M
$66,053	$62,963	$66,324	$41,160	$35,263	$48,536	$42,030	$41,105	$66,067	$66,340
$100M to $499.9M	$100M to $499.9M	$100M to $499.9M	$100M to $499.9M	$100M to $499.9M	$100M to $499.9M	$100M to $499.9M	$100M to $499.9M	$100M to $499.9M	$100M to $499.9M
$64,108	$62,073	$66,699	$38,206	$33,013	$45,783	$38,230	$40,167	$66,964	$66,463
$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M
$66,209	$64,695	$62,264	$41,667	$34,613	$45,816	$39,417	$43,750	$59,269	$68,694
$15 to $4.95	$15 to $4.95	$15 to $4.95	$15 to $4.95	$15 to $4.95	$15 to $4.95	$15 to $4.95	$15 to $4.95	$15 to $4.95	$15 to $4.95
$65,466	$65,422	$60,713	$44,124	$36,121	$48,594	$38,813	$44,102	$64,917	$69,633
$5B to $10B	$5B to $10B	$5B to $10B	$5B to $10B	$5B to $10B	$5B to $10B	$5B to $10B	$5B to $10B	$5B to $10B	$5B to $10B
$64,260	$60,100	$57,167	$39,750	$34,500	$43,400	$42,750	$46,063	$62,900	$63,900
$10B or more	$10B or more	$10B or more	$10B or more	$10B or more	$10B or more	$10B or more	$10B or more	$10B or more	$10B or more
$75,400	$62,013	$68,894	$48,667	$41,265	$62,261	$47,105	$48,833	$68,714	$68,000

RICHARD LAM

> [Two years ago,] consultants with little experience could mature way ahead of time. Junior to midlevel people were commanding salaries of $90,000 and up. Now they're getting $50,000 to $70,000, and only senior-level people are getting $70,000 and up.

BHARAT SINGH, DIRECTOR OF BUSINESS DEVELOPMENT, PEOPLE.COM CONSULTANTS INC.

MIDDLE MANAGEMENT

Project manager, systems and programming	Database manager	Computer operations manager	Technical support/help desk manager
Average salary	Average salary	Average salary	Average salary
$78,263	$77,573	$69,122	$62,957
Bonus	Bonus	Bonus	Bonus
$8,537	$7,197	$5,990	$6,485
Total	Total	Total	Total
$86,200	$84,770	$74,112	$69,472

A SAMPLING OF INDUSTRIES BY PAY (TOTAL COMPENSATION)

Financial services	Financial services	Financial services	Financial services
$98,436	$100,899	$85,906	$75,231
Computer hardware	Insurance	Chemical products	Computer hardware
$89,100	$90,000	$78,250	$72,500
Insurance	Business services, IT	Petroleum	Government
$85,929	$85,467	$77,500	$69,400
Wholesale/distribution	Retail	Business services	Health care
$84,000	$81,500	$71,575	$62,983
Retail	Health care	Business services, IT	Business services, IT
$83,833	$80,296	$71,429	$61,500
Utilities	Wholesale/distribution	Government	Telecommunications
$83,750	$78,250	$67,036	$60,333
Business services, IT	Media	Transportation	Business services
$83,706	$77,375	$66,500	$60,050
Transportation	Telecommunications	Wholesale/distribution	Transportation
$81,360	$73,250	$65,857	$59,625
Wood/paper	Computer hardware	Metal/plastics	Media
$80,500	$71,900	$65,770	$59,111
Health care	Government	Health care	Retail
$78,409	$69,395	$64,778	$50,250

AVERAGE TOTAL COMPENSATION BY COMPANY SIZE (COMPANIES RANKED BY REVENUE)

Less than $10M	Less than $10M	Less than $10M	Less than $10M
$77,750	$69,912	$58,050	$60,472
$10M to $99.9M	$10M to $99.9M	$10M to $99.9M	$10M to $99.9M
$84,643	$79,000	$66,566	$64,184
$100M to $499.9M	$100M to $499.9M	$100M to $499.9M	$100M to $499.9M
$94,124	$80,564	$66,061	$66,534
$500M to $999.9M	$500M to $999.9M	$500M to $999.9M	$500M to $999.9M
$87,855	$90,441	$86,020	$69,595
$1B to $4.9B	$1B to $4.9B	$1B to $4.9B	$1B to $4.9B
$90,326	$94,800	$71,673	$71,762
$5B to $10B	$5B to $10B	$5B to $10B	$5B to $10B
$98,722	$80,900	$87,766	$74,900
$10B or more	$10B or more	$10B or more	$10B or more
$104,204	$102,469	$104,706	$94,400

STAFF AND ENTRY-LEVEL

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Average salary	Average salary	Average salary	Average salary	Average salary	Average salary
$55,156	$60,000	$50,457	$53,542	$54,000	$57,021
Bonus	Bonus	Bonus	Bonus	Bonus	Bonus
$4,047	$4,470	$3,554	$3,000	$4,286	$2,697
Total	Total	Total	Total	Total	Total
$59,000	$64,000	$53,911	$56,250	$58,375	$59,000

Continued from page 29

$70,000 and up."

IT managers aren't lamenting the loss of the dot-com hiring frenzy.

"Just because we have everybody's money, doesn't mean that we're quick to give it away," says Monte James, assistant vice president of network services at Bank of Oklahoma NA in Tulsa, Okla. In general, budgets are tighter, according to James, and as a consequence, the bank is now a lot more selective about its IT projects and new hires.

"We need to justify to management what we're doing," says James. "It was less difficult to get sign-off last year."

"This is how it should have been," says Remy's Albarelle. "Demand was so high, but the supply was low, so you had to lower the bar. Now we're only looking at candidates that have 11 of the 10 things that we're looking for."

Both Albarelle and Singh say compensation for consultants has dropped by as much as 50% over last year. Instead of renting staff for lengthy projects, Remy's clients are now looking for permanent placements. "It's a good opportunity for consultants to get off-road and find a permanent home," says Albarelle.

COMPUTERWORLD'S 15th Annual SALARY SURVEY

Prodigals Return

Even IT executives who watched their turnover rates soar during the dot-com boom say it's their practice not to burn bridges.

"We had a couple of people that left to work at dot-coms," says Kesinger. "But both came back after six months, asking for their old jobs back. Not everything was as they had been told, and there were some overexpectations. Then there were layoffs."

James says that just because a former employee looked for a better compensation package and career opportunities elsewhere, that doesn't necessarily reflect poorly on that individual.

"I always tell them to stay in touch," says James. "If there were performance issues, we wouldn't take them back. But if it's a star performer, we'll definitely take them back."

Methodology

Computerworld's 15th Annual Salary Survey was mailed to IT executives across the U.S. in May and June. IT executives (522 in total) responded to our survey, providing information about annual salaries, the changes in salary levels from the same period in 2000 and the additional compensation for 23 IT senior management, middle management and staff and entry-level positions.

BUSINESSSALARY SURVEY

STAFF AND ENTRY LEVEL

"[Two years ago,] consultants with little experience could mature way ahead of time. Junior to midlevel people were commanding salaries of $90,000 and up. Now they're getting $50,000 to $70,000, and only senior-level people are getting $70,000 and up.

BHARAT SINGH, DIRECTOR OF BUSINESS DEVELOPMENT, PEOPLE.COM CONSULTANTS INC.

BUYER BEWARE: IT Equipment Auctions

Technology auctioned off from failed dot-coms might come at bargain prices, but many IT managers are wary of installing equipment with mysterious backgrounds. By Paul Kapustka

AMID THE EMPTY CUBICLES and deserted hallways of a failed Internet service provider (ISP) lies a potential hidden treasure: millions of dollars worth of barely used computing and networking gear, ready to be auctioned off at a fraction of its original cost.

In a botel ballroom across town, the assets of Pilot Network Services Inc., a former ISP in Alameda, Calif. — including a sizeable mix of Cisco routers, Sun servers and Dell and Compaq PCs — are heing sold in rapid-fire fashion to a packed house of IT professionals who are ready to pick over the bones of yet another dot-com carcass.

"Eight thousand here, $8,500 to you. . . . Come on, chicken," the auctioneer quips, trying to run up the price on a Cisco 4000 Series router, a piece of equipment that might sell new for three times that price. "Eight thousand going once, twice — sell it for $8,000," the auctioneer says, quickly moving on.

But even with the significant discounts, few Fortune 1,000 IT managers say they're willing to take advantage of the bargains available at auctions. That's because the upfront savings don't even begin to matcb the potential losses that could result from using equipment whose history may he a bit of a mystery, they say.

"If I buy a $20,000 no-name server vs. spending $50,000 for a Compaq, and then I lose $5 millioo in the first hour that server is down, it's hard to justify the savings on the hardware," explains ooe IT director at a large Midwestern bank who requested anonymity.

Still, the sheer amount of auctionable gear that's on the market — which joins the backlog in manufacturers' warehouses — has created a new distribution channel that some corporate buyers are tapping to find bargains for replacement and noncritical networking needs.

"I think that in the future, auctions will become more attractive," says Michael Sherwood, director of IT for the city of Oceanside, Calif.

Like other IT directors, Sherwood says that he wouldn't dream of putting used equipment into the most sensitive parts of his network — even if some of that equipment were still under warranty.

"Our network runs the [city's] police and fire safety systems, and we're not going to use anything but new equipment there," Sherwood says. "If that part of the network goes down, there's potential for loss of life. The savings just aren't worth the risk."

Steve Nitenson, a former department head for global network planning at Visa International Inc., says any large company with high network-failure liability will steer clear of auctions, mainly because the potential transaction losses outweigh the savings by several orders of magnitude.

"Imagine that you're Visa, and you put some low-priced PC in an access point and it breaks," says Nitenson, who left Foster City, Calif.-based Visa earlier this year to pursue a doctorate. "The millions in lost transaction revenue will far exceed the money you saved buying the PC at auction," he says.

But none of the gear at the recent Pilot Network auction goes unpurchased, which means that somebody's going to use the preowned equipment. Though the majority of used equipment seems to be headed into reseller stockpiles or even to eBay Inc.'s Web auctions, Nuri Otus, CEO and lead auctioneer at Redwood City, Calif.-based Realm Connect Corp. (whose AuctioNet division handled the Pilot auction), says large corporate buyers are already big players at his company's events.

"There are corporate IT buyers at all our auctions," says Otus, who declines to reveal their identities. "At the Pilot event, a large biotech firm spent a quarter of a million bucks, and there was also a large legal firm and a large accounting firm there, buying equipment for their networks," Otus claims.

Wes Clanton, who was at the Pilot event buying equipment for reseller Network Hardware Resale Inc. in Santa Barbara, Calif., says his firm doesn't sell much to large enterprise accounts. "The Fortune 500 companies buy new stuff," he says. "They want the warranty."

Sherwood says he has purchased some used equipment for Oceanside through resellers, mainly for replacement-part purposes or noncritical oetworking needs. Most resellers offer some kind of limited warranties, making such purchases less of a risk, Sherwood adds.

"In one recent case, we bought four similar switches for $10,000 total, where one new one would have cost us $20,000," he says. Yet eveo for his simpler purchases, Sherwood says he's more comfortable going through a middleman than bidding online or in a crowded auditorium.

"I don't have the authority to go somewhere and start bidding with public money," he says. "At least with a reseller, we have someone to go back to."

Kapustka is o freelance writer in Burlingame, Calif.

Auction Offerings

A view of a recent auction held in California by Realm Connect Corp. and a sampling of some of the computing equipment on the block.

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Managing Contractors in TOUGH TIMES

As corporate belt-tightening continues, many IT managers at large companies are leaning more heavily on in-house consultants in lieu of outside help. By Thomas G. Dolan

As IT departments adjust to a slowing economy and tighter IT budgets, third-party consultants are often the first to feel the brunt of any changes. But some savvy IT managers who have come to rely on freelancers are leveraging the economic downturn to get more bang for their consulting bucks.

The Hartford Financial Services Group Inc., for example, is cutting back on its use of outside consultants. "This puts us in a stronger position with the ones we do hire," says John Madigan, vice president of IT human resources at the Hartford, Conn.-based financial services firm.

"We're able to exert more pressure for a better deal, to get a reduced hourly rate or additional services for the same amount of money," Madigan adds. "They're saying, 'You guys are squeezing us!' But it's simple economics."

Like other big companies, The Hartford has increased flexibility by relying on its in-house consulting unit, which has more than 400 contractors. "We're turning more to them; they have a pretty good recruiting machine," Madigan says. Previously, consultants from outside the company were hired to fill recruiting gaps at The Hartford. Since the market has softened, however, "our in-house team is now recruiting outside consultants who are looking for work," he says.

Other companies are also finding it more cost-effective to build up their in-house consulting staffs.

"Rather than paying through the nose for expensive outside consultants, we've created a group of internal consultants who are not only forging closer ties with customers, but also generating new revenues," says Honor Guiney, CIO at National-Oilwell Inc. in Houston.

At The Limited Inc. in Columbus, Ohio, the need for new data mining and data modeling applications to better focus products and improve customer relations is leading the retailer to take a mixed approach to using consultants, says CIO Tom McFadden.

The company has assembled a team of both in-house staffers and outside consultants to work on systems integration and middleware for a new customer relationship management system, says McFadden.

Indeed, some IT executives continue to cost-justify the use of outside contractors where it makes good business sense.

Greg Clancy, executive vice president and CIO at Sallie Mae Inc. in Reston, Va., is working with Onex Inc., a technology consulting firm in Indianapolis, on a Web integration project. Clancy says Sallie Mae chose Onex because its rates are about half those of larger firms and there's less contractual paperwork with which to contend.

Enzo Micali, chief technology officer at 1-800-Flowers.com Inc. in Westbury, N.Y., says he used to rely heavily on outside consultants for Web development. But now that those applications are up and running, he has been reducing his reliance on outside help in lieu of internal staff.

"As we execute our activities in relation to the goals of the overall business plan, it may make good sense to outsource certain activities," says Micali. "There are two main reasons. The first is to accelerate a project, and the second is to recruit a specific skill we may not have."

Girding for Growth

Although most organizations are cutting back on their use of outside help, James Ellison, director of information systems for the Las Vegas Valley Water District, says his use of external contractors is independent of the economy.

The water district has recently completed a three-year project to add to or change a variety of applications, including water billing, order management and customer service systems. Ellison says he plans to initiate another big project in about 18 months and insists that the outside economy hasn't affected his decisions on either project.

"It's been said that the general economic downturn is a high-tech problem. But this is still a [growing] resort and retirement area," so these projects are needed to support that growth, Ellison explains.

For other organizations that are holding back on their external spending, the logjam of projects and work that has been put on hold due to the economic downturn should eventually turn in favor of outside contractors, says Maria Schafer, an analyst at Meta Group Inc. in Stamford, Conn.

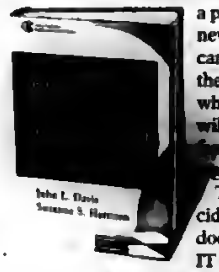
"Most companies do not have an integrated process for developing technical people. So even though outside consultants and contractors are currently in retreat, when the pendulum swings the other way, they will come charging back," she says.

Dolan is a freelance writer in the Pacific Northwest.

Finding Value, Safety or Escape

How to make the most of intellectual assets, IT networks and, if necessary, headhunters

Edison in the Boardroom: How Leading Companies Realize Value From Their Intellectual Assets, *by Julie L. Davis and Suzanne S. Harrison (John Wiley & Sons, 210 pages, $29.95).* Pundits and consultants often talk about how companies need to "leverage their intellectual assets to improve the bottom line." But managers often have trouble making concrete sense of that intangible concept. Davis and Harrison do an effective job of creating a framework and tools to help managers do just that, using a well-conceived five-level hierarchy of asset management.



Davis, worldwide co-partner of Chicago-based Andersen's property practice, and Harrison, co-owner of Menlo Park, Calif.-based Intellectual Capital Management Group Inc., draw upon best practices at companies such as Ford Motor Co., The Dow Chemical Co. and IBM, with practical advice for various types of corporate managers. They offer excellent insights for anyone who's interested in maximizing the potential value of their intellectual assets.

— Thomas Hoffman

Techno-Ready Marketing: How and Why Your Customers Adopt Technology, *by A. Parasuraman and Charles L. Colby (The Free Press, 224 pages, $27).* The two authors spent four years evaluating case studies and research projects on this topic and came to the following conclusion: Most high-tech companies rely on Old Economy approaches to market their products and services and, at best, do a mediocre job of it. That's primarily because few companies have taken the time or made the effort to understand customer behaviors and, in particular, how their consumers react to innovations.

Parasuraman, a marketing professor at the University of Miami, and Colby, president of Great Falls, Va.-based consulting firm Rockbridge Associates Inc., have developed a "technology readiness index" they say can measure a person's propensity to adopt new technologies. Readers can use the technique to help them measure the speed at which their own customers will adapt to new products, features or functions, according to the authors.

Though the book has a decidedly academic feel to it, it does have a few insights for IT managers who are trying to package and pitch key IT projects — especially those with commercial potential — to senior management.

— Thomas Hoffman

Security Transformation: Digital Defense Strategies to Protect Your Company's Reputation and Market Share, *by Mary Pat McCarthy and Stuart Campbell, with Rob Brownstein (McGraw-Hill, 204 pages, $24.95).* In the security world, it's often hard to decide who's right. Security wonks complain that businesspeople woo't pay for protection; businesspeople complain that it's impossible to cost-justify tight security because it only proves itself if nothing happens.

This easy-to-read, Security 101-type course tries to build a bridge between those two camps. Written by consultants at Netherlands-based KPMG International who have customer security experience, this text covers all of the basics of security: the risks posed by crackers and vandals, the business benefits of good security and continued uptime, and the risks of networks whose security holes stem more from sloppy configuration and planning than from bad software.

The authors address how businesses can protect themselves not only by staving off intruders, but also by tracking their movements once a firewall has been breached, and they cover the importance of maintaining an evidence trail and securing connections with business partners.

Best of all, the authors give managers a series of checklists to build their own cases for good security and explain how to determine what level of security is enough and what might be overkill.

— Kevin Fogarty

Be Hunted! 12 Secrets to Getting on the Headhunter's Radar Screen, *by Smooch S. Reynolds (John Wiley & Sons, 278 pages, $16.95).* As the IT hiring craze becomes a fading memory, a growing number of IT professionals are either looking for work or seriously wondering if they should dust off the old résumé and get back on the job hunt. IT professionals looking for high-end jobs need advice, especially during tough economic times like these.

However, the usual career advice about networking with peers and keeping your skills up-to-date doesn't teach most folks how to stick out from the crowd and get noticed by the headhunters who place candidates in the most lucrative jobs.

This book — written by the president and CEO of The Repovich-Reynolds Group, a Pasadena, Calif.-based executive search firm that counts Cisco Systems Inc., Dell Computer Corp. and a host of other companies amoog its clients — offers solid advice on how to work with headhunters. Unfortunately, it doesn't really get into how one should go about getting noticed by them.

Tips range from the sophisticated (how to show that your judgement is solid and mature; how to present a balanced, credible view of your work life; and how to negotiate compensation) to the remedial (table manners, punctuality and when not to throw a taotrum).

Reynolds also includes a list of other books and a few job-search Web sites, though the list is alarmingly small.

It's not a complete guide to a job search, but if you're looking for a step-by-step update to the techniques you've forgotten since landing your last major job, *Be Hunted* is a good place to start.

— Kevin Fogarty

The FreeBSD Corporate Networker's Guide, *by Ted Mittlestaedt (Addison-Wesley, 2000, 464 pages, $49.95).* Think there's no freeware on that high-end enterprise network of yours? Guess again. What do you think happens to your old servers when your network administrators need machines to run the Domain Name System or sendmail but don't have a budget for new hardware? Want to get up to speed with your own server and be able to identify what's going on within your network?

Mittlestaedt, an experienced network operations manager and FreeBSD user, offers this detailed, opinionated guide for the newbie FreeBSD administrator, including guidance on hardware, software and network configuratioo, as well as wheo and how FreeBSD and other noncommercial software is appropriate — and when it's not.

— Kevin Fogarty

Human Computer Interaction: Issues and Challenges, *by Qiyang Chen (Idea Group Publishing, 255 pages, $74.95).* Aimed at researchers and designers, this academic compilation of essays on the technology, psychology, engineering and ergonomics of interface design is intended to give readers an overview of human behavior factors in graphical user interfaces.

This book, which includes studies on intelligent agents, virtual reality, interface prototyping and a host of other issues, was primarily written by university researchers whose presentation is meticulous and whose bibliographies may be more valuable to interface gurus than the overview itself.

— Kevin Fogarty

Dear Career Adviser:

Six months ago, I interviewed with an enterprise software company that had about $100 million in annual revenue and $50 million in cash reserves. I took another programming job, but the company recently called me back and still wants me to work on a new Web-based product. Given today's weaker sales, is this company a riskier choice now than it was six months ago?

— WORRIED

Dear Worried:

Go visit a stockbroker's office and ask to see a Bloomberg machine, where you can look up the company's financial reports from the past three to six months, advises Marilyn Cohen, a *Forbes Magazine* columnist and president of Los Angeles-based Envision Capital Management Inc. This will let you see the bonds the company has recently issued and whether they're straight or convertible to warrants for the company's stock. You'll also be able to see the company's recent bank loans and whether it's in compliance with them.

Then contact the underwriting firm that took the company public, specifically communicating with an analyst who specializes in the company and the industry. Ask about the amount of money left from that $50 million in cash mentioned when you originally interviewed. Due to a slow economy and the performance of this sector, it's sure to be greatly diminished.

You might want to base your decision about this company on the longer-term prospects for its product set and its access to current capital.

Dear Career Adviser:

I'm a software developer who has spent two years working in software localization, solving cross-platform and cross-browser problems. I've contacted 24 companies, both direct employers and outsourcing companies, without success. Now I want to market myself as a senior Java programmer, but I don't think this experience is clear on my résumé.

— BEST GUESS

Dear Guess:

Your background includes experience with ColdFusion and other good Internet tools, and your résumé is packed with buzzwords, but the actual details contradict the senior Java experience you claim to possess, says technical recruiter Ilana Brody in Emeryville, Calif. In fact, until 1999, your career focused on desktop publishing and front-end work, which would at most give you two years of programming experience if you had worked in true software development jobs from that point forward.

Much of your skill set consists of libraries and tool kits rather than hardcore programming, and your work has concentrated on front-end work on Web sites. This area is where much of your competition is stiff.

Essentially, your job search is suffering because you're competing with candidates who have either a computer science or software engineering degree, in contrast to just computer science courses and on-the-job training.

Since you're really a midlevel Web developer, your best bet might be to find a brick-and-mortar company that needs a Web developer, or to return to school for a computer science degree. ▶

FRAN QUITTEL is an expert in high-tech careers and recruitment. Send questions to her at www.computerworld.com/career_adviser.

WORKSTYLES

Using IT to Help Take Off the Fat

Mission-critical systems: "Aphelion, a fitness-industry-specific database that contains all the information on our 181,000 members nationwide. We use it to set all of our sales strategy. For example, I'm just now working on a report for a member-retention campaign. I'm culling data on members who aren't using the club, and our personal trainers will use that to call those members and find out why they haven't been in and try to draw them back. It enables us to be more customer-service-oriented."

How are you using IT in the clubs? "We maintain a [Digital Subscriber Line] network in all of the clubs. Personal training managers use PCs to set goals and strategy for the trainers; the club managers and the sales staff all use PCs, and the counter people check in members via PC."

What's unique about working in IT for a fitness club chain? "The fitness industry isn't usually associated with high tech. People always ask me, 'What do you do at a gym?' But we use a lot of technology to make things easier for everyone who works here, and we're exploring more ways that we can use advanced technology to streamline operations.

"Also, working here rubs off on you. We get called to the clubs for support issues, so you end up knowing the personal trainers. They'll tell you should be eating this or that, and you start working out and getting more health-conscious."

IT training: "A couple of us are taking the [Microsoft Certified Systems Engineer exam] for Windows 2000."

IT career paths: "There are a lot of ways you can go. You can specialize in hardware or software, working with routers and wires, database administration, security. It all depends."

Workday: "I get here at 8:30 [a.m.], and I'm the early guy. The last guy leaves here about 6:30 [p.m.], and we're all on call via cell phone or e-mail. Sometimes you don't get any calls, and others the phone never stops. The beginning and end of the month get hectic."

Dress code: "There's no real dress code. You can't come in wearing whatever you want, but shorts and sneakers or sandals are OK."

Office décor: "Lots of bright colors. We have a punching bag. The [entrance to the] conference room is a garage door that opens up."

Office mascots: The Crunch Bunny and Crunch Penguin.

Little perks: "Free gym membership. It's really laid-back, and the people who work here are pretty cool. And I've met a lot of celebrity members. The whole cast of [the HBO series] *Oz* was working out at our downtown gym; we have a couple of boxers [and] some of the cast of MTV's *The Real World*."

Would employees feel comfortable e-mailing the CEO? "Definitely. You can walk up and talk to anyone here." ▶

Crunch Fitness International

Type of business: Health club chain

Main location: New York

Number of IT employees: Five, including two network administrators, an IT manager, a chief technology officer and the CIO

Interviewee: Yezid Acosta, network administrator. "But we don't really have titles."

Leslie Jaye Goff is a freelance writer in New York. Reach her at lgoff@ix.netcom.com.

THIS WEEK

OPTIMUM PERFORMANCE

Adding CPUs to a server doesn't automatically mean dramatically increased scalability. Find out how some companies get more from their symmetrical-multiprocessing-capable machines. PAGE 40

CUSTOMIZATION QUANDARY

Companies can customize enterprise resource planning applications if they want software with industry-specific functionality, but the process is expensive and difficult, and the customized software may be unstable and prone to glitches. PAGE 42

RED FLAG

Hackers have moved from targeting individual sites to orchestrating massive attacks against the Internet itself. The security community needs to mobilize, because the Internet is just one attack away from a major disaster, says SANS Institute Director Stephen Northcutt. PAGE 44

HANDS ON: What happens when you assemble a computer and it doesn't work? Sometimes the smallest mistakes involving the simplest of hardware can have far-reaching and unpredictable effects. PAGE 46

NICHOLAS PETRELEY

Debunking Microsoft

WHEN MICROSOFT PROMOTED ITS SUPPORT of Kerberos authentication in Windows 2000 as evidence of its new commitment to open standards and interoperability, only a few Microsoft stockholders and someone named Arnold from Truckee, Calif., fell for it. The rest of us yawned when tbe news broke that the company had added proprietary extensions that would lock customers into an all-Windows environment if they wanted to exploit all of the features of Active Directory. So far, the strategy has flopped, but only because customers are deploying Active Directory at about the same rate as Zero Administration Windows and the NetPC. (Remember those?)

If you consider this to be Microsoft-bashing, you're right, at a superficial level, but you're missing the point. I would gladly bash IBM, but IBM lost its control over the market when it underestimated the future of the PC. That's what this is all about: control. Microsoft, like the IBM of old, is more interested in controlling your buying decisions than it is in serving your needs.

Hence the problem with the amorpbous blob that is Microsoft .Net. The company is doing everything it can to sell .Net as an open infrastructure, but it's all about control.

For example, Microsoft wants you to believe that its commitment to XML means that you'll be able to share .Net-based information across dissimilar platforms. Hogwash. All XML amounts to is a standard way of pointing to things. XML doesn't have anything to say about whether the things it points to also conform to standards.

A perfectly standard XML file can say, "This thing is a title, this other thing is a menu, and this last thing is an ActiveX component." If your platform doesn't support ActiveX components, that's too bad. Since it's a foregone conclusion tbat Microsoft will be littering its XML with pointers to Win32-based components, the best that can be said about its adoption of XML is that it will make it easier for browsers and applications on non-Windows platforms to understand which parts of the document it must ignore.

If Microsoft was genuinely interested in XML as a means to greater interoperability, it would guarantee that its Office applications and .Net development tools would produce XML files that never point to Win32-specific components. Instead, whenever XML files point to active content, such as an executable component, that executable content should be platform-neutral. And we all know what that means, folks: Java, the environment Microsoft is dropping from future versions of Windows.

In place of Java, Microsoft is offering C#, which doesn't produce platform-neutral components. Quite the contrary: C# is designed to produce applications that keep everyone on Windows.

Microsoft is dodging this issue by trumpeting the fact that it has submitted the C# language specification to the ECMA standards organization (*www.ecma.ch*). This is a public relations attempt to make Java look proprietary and C# open.

The problem is that it doesn't matter how open the C# language itself may be. C# applications will rely on Microsoft's Common Language Interface for .Net in order to run.

The Common Language Interface has merit, but it's important to understand that it isn't the equivalent of a Java virtual machine (JVM). The point of a JVM is to let you run Java applications on any platform. The goal of the Common Language Interface is to let you use programming languages other than C# to write .Net applications. It does nothing to enable you to run applications on an operating system other than Windows.

Worse, the common language interface is tied directly to Microsoft-provided services like HailStorm and Passport. Even with XML, not only is .Net contrived to lock e-commerce providers and customers into running only Microsoft software, but it's also specifically designed to produce software that uses the Passport authentication service, the Microsoft-controlled tollbooth for e-commerce transactions on the information superhighway.

If this isn't enough to raise concerns about using .Net, next week, we'll look at the network security implications. ▶

NICHOLAS PETRELEY has been a computer consultant, teacher, programmer and author for 20 years and is the founding editor of VarLinux.org (www.varlinux.org). Reach him at [redacted]

Multiple P
[MAXIMUM PE

Achieving scalability takes more than just adding CPUs to a server. Here's how some companies are getting more work out of their SMP-capable machines.

By Barry Nance

PLAYING CHESS, predicting the weather and simulating nuclear explosions are highly CPU-intensive applications. IBM's latest Deep Blue chess master, for example, is a 32-node IBM RS/6000 SP high-performance computer, and each node has eight onboard CPUs. The 256 processors work together to calculate 60 billion chess moves within three minutes, the time limit for each player's turn.

But Deep Blue might find itself in deep trouble if it had to process claims for a large insurance company or track reservations for a large hotel chain.

For years, capacity planners have reminded CIOs that a computer, network connection or workflow process is no faster than its slowest componeot. Adding more processors to a server doesn't in itself confer scalability to the applications that the server runs. Replacing a two-way server with an eight-way one won't provide faster performance for an I/O-bound application.

In most business environments, matching CPU power with disk and network I/O throughput is the key to getting work done. In some cases, a multiprocessor computer wedded to a storage-area network (SAN) may be the answer, while clustering is right for others. Use a capacity planner to help choose and configure your servers.

If the application is designed to take advantage of extra CPUs, multiprocessor servers are an effective and appropriate tool for CPU-bound software.

All modern server operating systems — including OS/390, Windows NT Server, Windows 2000 Advanced Server and Datacenter, Solaris, AIX, HP-UX and Linux — can concurrently execute computer programs on different CPUs. Still, the application's design determines how well the software can use multiple CPUs. Moreover, balancing quicker I/O with a symmetrical multiprocessing (SMP) environment can help you see real improvements in transactioo response times or get more work done in a giveo time frame.

Hilton Hotels Corp. has 85,000 employees, more than 400 properties with more than 140,000 rooms, and a sizable franchise operation. With the logistics involved in booking rooms, scheduling banquets and buying tons of fresh food, Hilton rivals a major airline in its need for automation. Damien Bean, vice president of corporate systems at Hilton's Beverly Hills headquarters, says the company's major applications all lend themselves to concurrent operation on SMP servers.

Hilton uses in-house-developed applications to process room reservations and manage each hotel's front-desk chores. One of them runs on RS/6000s. For the front desk, another proprietary application, acquired when Hilton bought another hotel chain, runs on Intel Corp.-based computers. The company also uses PeopleSoft 8 and employs WinFrame software from Citrix Systems Inc. throughout the enterprise. Hilton is now migrating from Microsoft Corp. SQL Server 6.5 to 7.0.

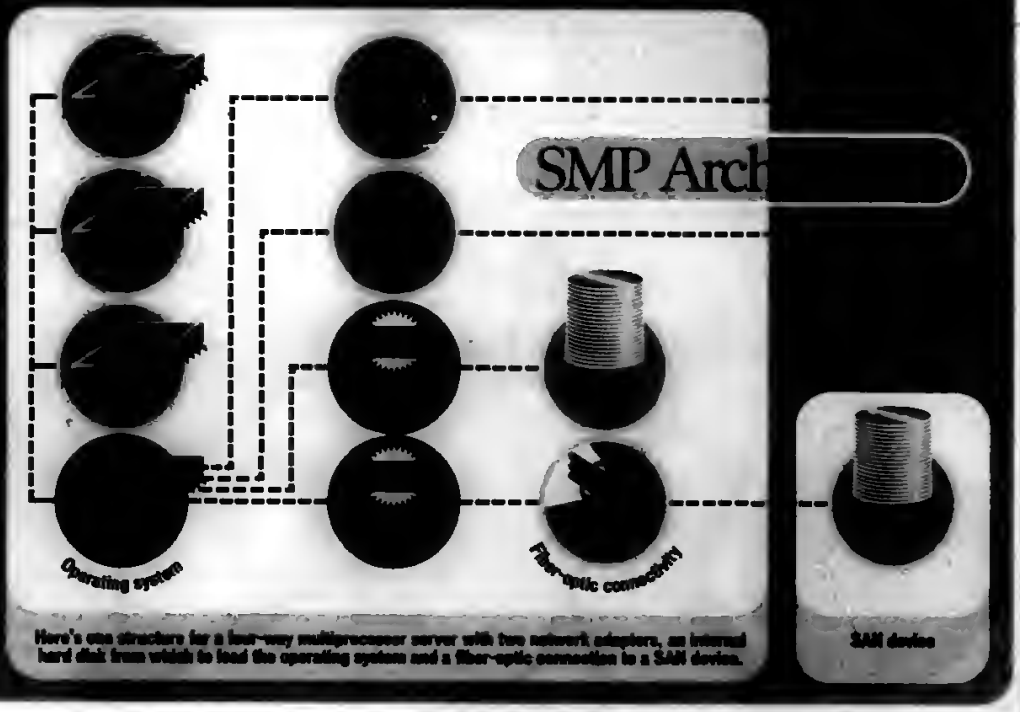
Besides the diverse platforms used by independently owned franchises, Hilton has six HP 9000s running HP-UX, three Sun Microsystems Inc. Enterprise 10000s running Solaris, several RS/6000s running AIX, a pair of AS/400s and more than 400 Windows-based Intel servers. Few RS/6000s have multiple processors, but one HP 9000 has 20 (out of a maximum of 32) CPUs. The HP 9000's applications are I/O-bound, Bean says, so adding more CPUs wouldn't speed processing.

Last November, Hilton began putting SMP-capable servers from Dell Computer Corp. in its properties and Memphis data center. Bean notes that about half of the compaoy's Intel-based servers are SMP-capable — most are two-way, but there are a few four- and eight-way servers in the organization. About 20 servers have two network adapters. These SMP server machines run Windows 2000 Advanced Server.

Bean says he avoids I/O bottlenecks in the Dell servers by connecting them via Fibre Channel to Clariioo SAN units from EMC Corp. in Hopkinton, Mass. For Hilton, scalability means running the same software in all of the company's different-size hotels. Bean looks at scalability "in terms of negotiating computer capacity with respect to the greatly varying needs of the different hotels and inns," he says, noting that he's happy that the Hilton applications are highly scalable.

"With SMP-capable Intel servers, I can afford to have a spare eight-way database server sitting around as a replacement if there's a problem with the first database server," Bean says. "Furthermore, using EMC's Clariion for data storage means switching to the replacement server is a piece of cake."

Identifying duplicate claims to save money for health insurance companies and health maintenance organizations



Here's one structure for a four-way multiprocessor server with two network adapters, an internal hard disk from which to load the operating system and a fiber-optic connection to a SAN device.

is a CPU-intensive effort, and the I/O is also nootrivial. Paul Dalberth, a database administrator at Bloodhound Inc. io Research Triangle Park, N.C., says his company's ClaimsGuard Overpayment Protection software plows through reams of health claims on two four-way Dell PowerEdge 6400 servers, using fuzzy logic to flag errors and questionable payments.

Like Hilton, Bloodhound uses EMC Clariioo SAN units to store the data for quick access by each SMP server.

Bloodhound has about 20 servers, but the two Dell SMP machines are its workhorses. Each has two Fibre Channel links to the EMC units, as well as two network adapters. Both servers ruo Oracle8i and SQL Server 7 under Windows NT Server.

The multithreaded claims-review software, written by Hilton programmers in Perth, Australia, lets the software take advantage of the multiple-CPU environment. Dalberth says the multithreaded versioo processes claims 50% to 75% faster than a single-threaded version. "Just throwing SMP at a performance problem iso't a good idea," he says. "Making good use of SMP depends on whether the applicatioo is designed for it."

If Bloodhound's SMP servers run out of steam as the processing load grows, Dalberth adds, the compaoy will likely use clustering to spread the workload.

SMP Helps You Retire Earlier

Managing investment portfolios and automating a stock exchange trading floor are time-sensitive operations. Chicago-based brokerage firm William Blair & Co. runs a portfolio management application called Advent and a trading-floor front-end application called Moxy on two- and four-way ProLiant DL360 and DL580 servers from Compaq Computer Corp.

Jim Connors, Blair's chief technology officer, says the company has 90 servers, about 20 of which are SMP-capable. The SMP-based e-mail server runs Microsoft Exchange and is the only server with two network adapters. SQL Server 7, the applications' data repository, also runs on a four-way ProLiant server. Windows NT is used for both servers and clients, but Connors' department is upgrading servers and approximately 1,000 desktops to Windows 2000.

Like Hilton and Bloodhound, the brokerage house bypasses the servers' internal hard disks. It stores critical application data in Compaq's StorageWorks SAN environment.

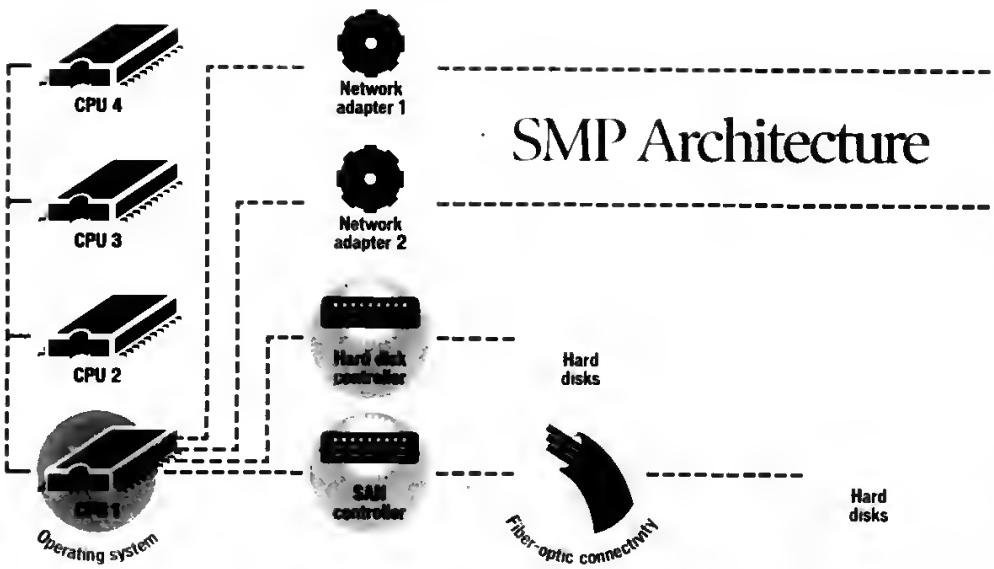
Connors says moving from two-way to four-way servers offered a 50% performance gain for the moderately CPU-bound Advent software but only a 10% to 20% gain for the company's customer relationship management application.

"Using SMP to solve performance problems is sometimes the wrong approach," Connors says. "The problem might be high network utilization, poor application design or just plain too much disk I/O."

"All CPUs wait at the same speed" is a popular dictum among capacity planners. A multiprocessor server is a waste of money if the disk drive or network adapter is the bottleneck. On the other hand, an SMP environment can often turn a CPU-bound sluggard into a thoroughbred racer. ◗

Nance is a software developer and consultant in Wethersfield, Conn.

Processors
ERFORMANCE]



Here's one structure for a four-way multiprocessor server with two network adapters, an internal hard disk from which to load the operating system and a fiber-optic connection to a SAN device.

is a CPU-intensive effort, and the I/O is also onerous," Dell Dalberth, a database administrator at Bloodhound Income Research Group Pty. Ltd., says his company's claims-and-Diver payment Protection software plows through claims of healthy claims on two four-way Dell PowerEdge 6300 servers using fuzzy logic to flag errors and questionable payments.

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If Bloodhound's SMP servers run out of steam as the processing load grows, Dalberth adds, the company will likely use clustering to spread the workload.

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rocessors
RFORMANCE

To Custom

Users must weigh the potential advantages their specific needs agains

CALL IT A CAUTIONARY TALE Earlier this year, Beaverton, Ore.-based footwear maker Nike Inc. faced serious inventory reduction and misplacement as it rolled out a highly customized retail supply chain system that included applications from Dallas-based i2 Technologies Inc.

At the time, i2 said the difficulties stemmed from tying the customized applications to other enterprise resource planning (ERP) and back-end systems.

And this case isn't unique, say those who advise against tinkering with ERP applications. While customizing may give you industry-specific capabilities, it can be expensive and difficult, and the custom software may require special maintenance, say critics. It may also make the core application unstable and prone to glitches.

But there's another side to the debate. Some IT professionals view at least some customization as not just desirable, but also inevitable. They point out that when firms install pure, out-of-the box applications, they may have to part with code and functions that have been developed over years to suit particular business processes.

"Every ERP installation is customized," says Steve Abrams, senior vice president of corporate payment solutions at Purchase, N.Y.-based MasterCard International Inc., which is running Oracle Corp. business applications. "No one installs out of the box."

The problem for some is deciding just when to risk tampering with the ERP code. "There really isn't a rule of thumb [about customizing]," says Karen Peterson, an analyst at Stamford, Conn.-based Gartner Inc. "However, I would recommend that cus-

ize Or Not?

s of tailoring ERP systems to t increased costs and risks. By Marc L. Songini

tomization is only to be used when competitive advantage capabilities are required and are not within the core product."

Peterson says companies are leaning more toward vanilla ERP upgrades. Writing custom code is costly and can make it difficult to upgrade to newer versions of the application, among other problems, she adds.

But sometimes customization is the only answer to a specific business problem. For instance, according to an SAP AG spokesman, a bank in a South American country with a high crime rate had an unusual request for an ERP customization.

While implementing SAP's supply chain application, the bank, which asked not to be named, decided it needed to be able to forecast the demand for cash on peak withdrawal days, such as Fridays before Christmas or other public holidays, while factoring in, among other variables, the chance that a branch might be robbed. The spokesman says SAP fine-tuned the software to optimize the bank's money transportation operations, factoring in the possibility of theft. The transportation system became more efficient, and resulted in a 20% reduction of costs and a full return on investment in four months.

The Dark Side

The trouble, of course, is that botched customization jobs can lead to disaster — as in Nike's case. The wide range of footwear products Nike sells also led to further difficulties in mapping the supply chain software to internal business processes. Nike Chairman and CEO Philip Knight, facing a drop in stock price and revenue, told shareholders, "I guess my immediate reaction is, 'This is what we get for $400 million?' "

However, an i2 spokesperson said recently that the problems the companies had getting the technology to work were "in the past." She didn't detail how they arrived at a solution.

Such crises discourage users from venturing out onto the thin ice of customization. "It's a risky strategy," says Walter Taylor, ERP program director at Atlanta-based Delta Air Lines Inc.

Taylor is overseeing an SAP R/3 implementation for Delta. He says he opposes customizing because SAP already has solid applications with best practices built in. When you start tinkering with the code, you make the application unstable and start losing benefits, Taylor says. "It's better to re-engineer your business processes than rewrite code," he says.

Although there are some horror stories, Taylor says SAP implementations aren't that difficult — if you go vanilla. Things get rough when you start trying to integrate SAP into legacy systems or trying to bolt on third-party applications. And if you're going to start to customize, you might as well start assembling complex best-of-breed packages as well, he says.

"I think most companies don't make these decisions very well," says Scott Stephens, chief technology officer at the Supply Chain Council Inc., a Pittsburgh-based industry consortium. "The folks with big [in-house] software groups tend to do it and then get stuck with software they have to maintain."

On the other hand, companies with clout can get the vendor to actually write their customization into the next software upgrade.

"Sophisticated companies look for software that can be tailored at the script level vs. changing the application kernel," Stephens says.

Some users may mix and match applications. Peabody, Mass.-based medical systems and components maker Analogic Corp. two years ago implemented a human resources application from Pleasanton, Calif.-based PeopleSoft Inc., but did things like adding extra fields into its supply chain and engineering-related ERP screens, says Analogic CIO Thor Wallace. He says that as long as you stick to the PeopleSoft parameters, the customizations will work even when you do an upgrade. He says companies should only customize applications gradually.

"These ERP systems are so big, you've got to take bite-sized pieces and bring up the system largely vanilla and then customize the areas," he says.

Toronto-based Bank of Montreal uses both homegrown and customized applications as well as ones right out of the box, according to Steven Pare, e-procurement team leader. Last October, the bank started rolling out Oracle's e-business applications to handle Web-based expense reporting and procurement, replacing an existing mainframe based legacy system.

To make the most of the savings of this automation, Pare avoided tampering with the applications — except within the configuration framework provided by Oracle, which permits changes in workflow processes. For instance, he can configure the application to match invoices to receipts or purchase orders. The ERP applications he's rolling out aren't mission-critical, and it's better to rely on Oracle's code-writing and installation expertise to get the job done, Pare says.

"From our point of view, we're e-procurement people, not programmers," he says. "Oracle has an army of programmers, let them develop it." ◗

Weighing ERP Customization

BENEFITS

1. It can give software industry-specific capabilities.
2. It can help companies preserve homegrown tools.
3. It can enable users to react to unique problems and give them competitive advantages.

RISKS

1. It can be costly.
2. It may make upgrading more difficult.
3. It may make the core application unstable.
4. It may make the system more prone to glitches.

Reality Intrudes On the Internet

Stephen Northcutt, who developed the U.S. Department of Defense's Shadow intrusion-detection system (IDS), is a director of the SANS Institute in Bethesda, Md., where he teaches classes about information security topics. He has also written several books about information security. Computerworld's **Robert Mitchell** *caught up with him at a recent training conference in Ottawa. In that conversation, Northcutt raised alarms about the vulnerability of the Internet and the networks connected to it.*

What limitations do you see in today's IDSs? We just cannot handle the bandwidths that are available. Vendors claim to have good sensors, but they just don't pan out.

Another fundamental limit that's killing us is cryptography. A lot of advanced hacker code is encrypted with tools like Bruce Schneier's Blowfish (*www.counterpane.com/blowfish.html*) algorithm. Not only can't we detect the encrypted information, we almost can't build IDSs that can detect that there is encrypted information.

The next problem is the number of signatures. Depending on who you talk to, you might say there are 1,000 rules. But compare that to any antivirus tool. [It has] 40,000 rules. This is another indication of how much we're in our infancy.

Another limitation is that IDSs are a single sensor in a huge world of events. There's no other way to describe Code Red other than an attack on all of the Internet, because when you have 300,000 compromised boxes scanning as many hosts as they can, everybody's Internet safety has been touched.

What does that mean for Internet security? To put it bluntly, we're one major attack from losing the bubble. The original Code Red worm was not that big of a deal. But a slightly smarter attack code will be capable of doing significant harm, to the point where we could lose connectivity in parts of the Internet. It could be a day or two before we [recover], and that's a whole lot of downtime if you're Amazon.com.

How can the information security community respond to that? What you have to have is constellations of sensors working together in order to get results that let you see that there's possibly a zero-day vulnerability or some massive growth in a known vulnerability. A zero-day vulnerability is one that exists but has not been announced yet.

DShield (*www.dshield.org*) is one of a number of experimental techniques. The idea is to get everyone to run code on their system or firewall, and as they get attacked, report it to a central place that can monitor those attacks.

Should software vendors be held liable for security defects that result in attacks such as Code Red? We have two possibilities. One is the operating system company. Microsoft is a good example, especially in the case of IIS [Internet Information Server], because it's inarguable that IIS is not engineered in such a way as to be secure, therefore it's a deficient piece of software. The other potential [group] to go after are the [Internet service providers]. ISPs could have done something [about Code Red]. They actually could have patched their boxes. Another thing they could have done with Code Red is blocked port 80.

What's the most common misconception you hear from security managers who take your classes? They actually think you can make the vulnerabilities go away. The complexity of modern [operating systems] is so extreme that it precludes any possibility of not having vulnerabilities.

What needs to be done to correct these vulnerabilities? Good coding allows you to prevent buffer overflows. That's just cheap coding — avoiding error checking — that makes these buffer overflows, [which are] one of the common techniques used to exploit systems, possible.

The other thing is to identify the 10 vulnerabilities that are most commonly used to break into any given operating system. As these things become coded into rulers or yardsticks, if an operating system company releases a new version that doesn't fix the well-known vulnerabilities, they're acting below due diligence. And we need to hammer them for that.

Should companies be more aggressive in prosecuting attackers? I think we'd better start right now, because the cost of hacking is nearly 100% free. It's a criminal act. If they succeed and do harm, then you've lost a lot of money, prestige, revenue.

We need to educate prosecutors and law enforcement agents. But to make a difference, we need to start prosecuting as many cases as we can in civil court. You can win these cases.

Some IDS products claim to take steps to block an attack. How well do these tools work? This is what we call active defense. You can set up shunning with IDSs. You can hook them to a firewall.

Another very interesting technique is rate limiting. If you suddenly shun an attacker, then they know you've responded, but what if you just start responding slower and slower? Especially for keyboard-style attacks, it will drive [the attackers] absolutely crazy. What every sane person is trying to get to is intrusion protection. I need my IDS to scream bloody murder when my Web server gets attacked by something that I'm vulnerable to. And if the attacker succeeds, I want to be able to do rollback to my good pages as fast as possible. Today, [vendors] are starting to come out with commercial tools that do this.

How much effort should organizations put into security efforts before they reach diminishing returns? In 2001, did the defensive security community gain ground or lose ground? I'd say the answer is pretty self-evident. If we lost ground, we shouldn't be thinking about diminishing returns, we should be thinking about survival.

Until we come up with some leadership, until we come up with some programs like a DShield on steroids, until we can come up with active response and until we start busting some attackers, I don't see any hope of turning the corner.

WHO IS HE?

Stephen Northcutt developed the U.S. Department of Defense's Shadow intrusion-detection system. He is a director at the SANS Institute in Bethesda, Md.

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THE BEST-RUN E-BUSINESSES RUN SAP

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Do Sweat the Small Stuff—Really

Our reviews editor learns that not paying attention to details can have disastrous consequences. By Russell Kay

EVERY YEAR, I BUILD at least one computer from components. I think of it as a way of staying in touch with my hardware demons.

A while back, I started putting together a desktop computer with components chosen for silent operation and based on the Silent PC case from Ann Arbor, Mich.-based SP North America Inc. (SP NA). This German-made equipment offers silent operation, made possible by special sound-deadening materials, temperature-controlled, near-silent fans and the use of an especially quiet Fujitsu Ltd. hard drive with fluid bearings. The hardware for mouoting the motherboard was different from anything I had previously encouotered, but it went together all right.

The Guts

Here's what makes up my homegrown machine:

Case: SILENT PC

Motherboard: Fujitsu-Siemens 1219 with onboard sound, video, 10/100 Ethernet LAN adapter; baby ATX form factor

CPU: Intel 800-MHz Pentium III

Memory: 256MB Kingston Technology Co. PC-133 ValuRam

Disk drive: 20GB Fujitsu MPG3204AT-E

DVD drive: Creative Labs 6X

CD-RW drive: Teac America Inc. WB516E (16X, 10X, 40X)

Graphics card: Matrox Electronic Systems G450 dual-head, 32MB

Sound card: Philips Electronics NV SC706

Second network card: 3Com Corp. Model 10/100 NIC

Operating system: Windows 2000 Professional, Service Pack 1

Keyboard and mouse: Logitech International SA Cordless Desktop

No Noise - No Nothing

After I got all the parts of the system together, I powered it up. An LED on the motherboard lit up, the disk drives spun up aod . . . nothing else. No BIOS bootstrap, no power-on self-test beeps or on-screen messages, nothing. The troubleshooting documentation suggested bad memory. I replaced it with aoother memory module that I knew worked. Still no response.

I consulted with Thomas Schramm from SP NA, and he was perplexed. Oo a hunch, I bought a new CPU and plugged it in. No dice. Schramm sent me a replacement motherboard, a slightly newer model. No change. No boot. No computer. Nada.

To say that I was upset and frustrated is putting it mildly. This wasn't the first system I'd tried to build; it was more like the 20th, and I'd never had such a problem before.

Recall those car commercials oo TV with the discreet subtitle, "Professional driver, closed course. Do not try this yourself." Well here *I* was the trained professional, and I couldn't make it work.

After I had exhausted all my own ideas, Schramm suggested that I ship the whole unit to him and his staff would check it out. I did so, then went on vacation and forgot about it.

A couple of weeks later, the phone rang. it was Schramm, who said, "I've got your system here, and it's running fine."

"What did you do? What was it?" I asked.

"I just took the motherboard out of the case," he chuckled.

"Huh?"

"When you installed the motherboard," he continued, "you used the wrong screws, ones that were too big. And you put in some clips that you didn't need, clips meant for nonstandard motherboards."

"Huh?" I repeated disbelievingly. "You're saying I used the wrong screws?"

"The screws didn't actually cause the problem, though they did make bigger holes in the mouoting areas," he said. "The real problem was the clips. They evidently shorted out something on the motherboard." In fact, he said, "all the motherboards you tried work just fine!"

Unplugged

After I got the system back, I set up Windows 2000 and numerous applications, and it ran well for a week or so. At that point, I installed a floppy disk drive in the system, buttoned it up and hit the On button. The system wouldn't even boot. The drives would spin up, then down, and that was that. No beeps, nothing on-screen, nothing happening. I substituted a different floppy drive; same behavior. I unplugged the floppy, and the system booted up just fine.

At a trade show, I was telling a former colleague about my mysterious problem. He knew the answer instantly. Today's 3.5-in. floppy drive uses a very small power coonector that's keyed to plug in only one way. However, it's small enough and flimsy enough that you can plug it in upside down or offset it by one or two pins, or both. Get it upside down and you fry the drive. Get it one pin off (and it's nearly impossible to see that you've done this) and you get the mysterious nothing that I encountered.

I unplugged and replugged the power connector very carefully this time, and all was well.

There was a popular slogan a few years ago: "Don't sweat the small stuff," which was always followed by "Remember, it's all small stuff."

I disagree. I was tripped up by some of the smallest parts of the computer: Mounting hardware, screws and clips, and a small plug installed wrong by a tenth of an inch.

It was all small stuff that I dido't want to sweat. And the small stuff made the difference between success and failure. ◗

The Sound Of Silence

Now that I've got my Silent PC-based system up and running, I have to report that it is remarkable.

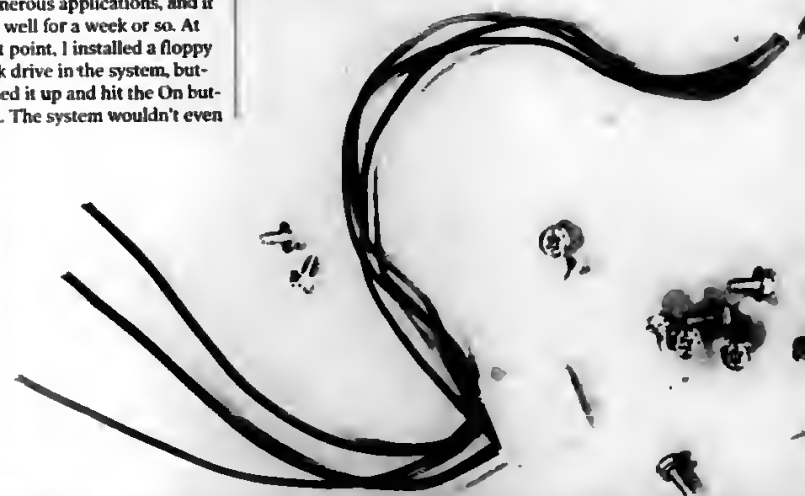
Except when the CD drive is turning, it makes no perceivable noise. My Dell laptop is far noisier. Even my laser printer in standby mode is noisier. The PC, though, is really quiet.

On occasion, you can hear a few muffled clicks from the Fujitsu drive. The CD drive is another matter, sounding rather like a helicopter when it spins up – seeming to make even more noise because there's nothing else to mask it, as we're used to.

As an experiment, I installed a second hard drive, a 3-year-old 7,200-rpm, 14GB IBM DeskStar. The increase in noise was immediate. After the previous silence, it was nearly unbearable. I pulled the drive as soon as I could.

I'm currently looking at a new 80GB Barracuda drive from Scotts Valley, Calif.-based Seagate Technology Inc. that promises silence. I'm also looking at one of their 15,000-rpm Cheetah drives, meant for servers, that I expect will be a real screamer . . . in more than one sense of the word.

– Russell Kay



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Spooling

DEFINITION

Spooling a computer document or file is the process of reading it and storing it in a buffer, either on a hard disk or in a special area in memory, so it can be printed or otherwise processed at a more convenient time — for example, after a printer has finished printing another document.

BY ALEXX KAY

TO UNDERSTAND spooling, think of it as the process of reeling a document or task list onto a spool, like thread, so it can be unreeled at a more convenient time. Spooling is useful because devices access data at different rates. The spool buffer provides a waiting station where data can rest while a slower device, such as a printer, catches op. When the slower device is ready to handle a new job, it can read another batch of information from the spool buffer.

The term *spool* is actually an acronym — it stands for *simultaneous peripheral operations online*. The idea of spooling originated in the early days of computers, when input was read from punched cards for immediate printing (or for processing, followed by the immediate printing of the results).

Since computers operate at a much faster rate than I/O devices such as printers, it was more effective to store the read-io lines on a magnetic disk until they could be conveniently printed, when the printer was free and the computer waso't so busy working on other tasks.

The most common form of spooling is print spooling. Documents that are to be printed are placed in a print queue and then printed one at a time as the printer becomes ready for them. Most often, they're printed on a first-come, first-served basis, hut some systems allow documents to be prioritized so more important documents can be printed first. Modern printers do have memory buffers of their own, but frequently, they aren't large enough to hold entire documents (or multiple documents), requiring multiple I/O operations with the printer.

Print information for files containing pictures, color or complicated formatting can be very large and can take a long time to fully download to a printer. Since the print queue handles these multiple I/O operations in the background, a user can go on with other tasks while a document is still in the process of printing.

The Benefits

The spooling of documents for printing and batch job requests still goes on in mainframe computers where many users share a pool of resources. With the proliferation of low-cost printers, however, many users have printers of their own and need not share them with others. Even in this case, however, print spooling remains useful, because it allows users to continue working while printing in the background. Spooling even makes it possible to set up multiple print jobs at once without having to wait for each job to complete before starting the next.

In complex work enviroo-ments where many different types of computers with different operating systems are networked together, it's often possible to set up shared print spooling to common printers. This can become fairly complicated, though, since the data will need to be translated to or from several different formats and often requires third-party software, hardware or consulting services to get everything working smoothly.

While the term *spooling* most often refers to print spooling, other kinds of data are also spooled in some applications.

Mail spoolers collect e-mail (or other data, such as Usenet newsgroup postings) for delivery at a later time so the sender doesn't need to be connected to the Internet just to compose an e-mail message.

Graphics applications may need to spool data to the hard disk if a computer's RAM can't hold an entire image at once. Similarly, video compression and decompressioo programs that require a lot of memory may spool data to disk.

There are eveo occasional applications for spooling input (as opposed to output), but these are relatively rare. Spooling data even occurs among some kinds of automated equipment used in high-tech factories.

Finally, coming full circle, the word *spool* is sometimes used in a technical context that's rather closer to normal English usage — referring to spools of magnetic tape used for data storage. Some kinds of data tape are unwound into a device before use and thus aren't physically connected to the reels that they're stored on. In this case, *spooling* refers to the act of winding the tape back onto the physical spool.

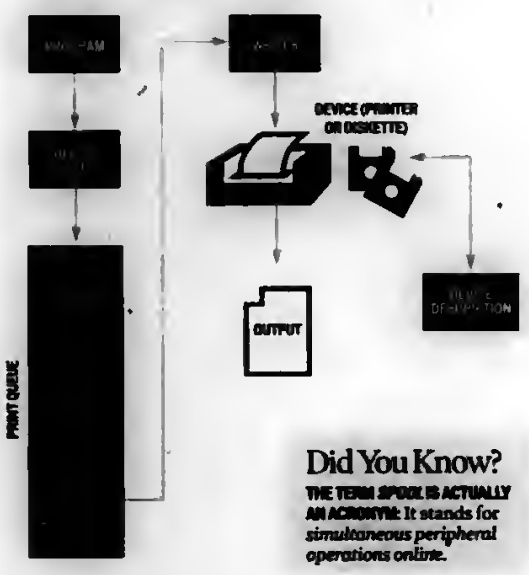
Kay is a freelance writer in Dorchester, Mass.

Quick Link: For a complete list of Technology QuickStudies, visit our Web site at www.computerworld.com/q?q3000

How It Works

Kinds of Spoolers

1. **PRINT:** The most common example of spoolers, print spoolers are oued in virtually every operating system and network.
2. **MAIL:** These collect e-mail (or other data, such as Usenet newsgroup postings) for delivery at a later time.
3. **GRAPHICS:** Graphics applications may need to spool data to the hard disk if a computer's RAM can't hold an entire image at once.
4. **VIDEO:** Compression and decompression programs that require a lot of memory may spool data to disk during their operation.



Did You Know?

THE TERM *SPOOL* IS ACTUALLY AN ACRONYM: It stands for *simultaneous peripheral operations online*.

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Legal Insecurities Stymie Web Site Outsourcing Deal

Major security concerns take a back seat as ASP and corporate lawyers argue over minute details

BY VINCE TUESDAY

MY ORGANIZATION is changing rapidly these days. We're selling our key technology in several global markets, and we're looking for ways to improve the way we work. One avenue is through outsourcing.

After an internal debate about outsourcing our security monitoring work, we concluded that the time wasn't yet right. However, we are ready to outsource other technologies. These aren't core to our business, and they're expensive and difficult to do properly. One such technology is our outward-facing Web site.

SECURITY MANAGER'S JOURNAL

It sounds like a very simple task, outsourcing a straightforward service. But the use of an outside vendor raises a range of security concerns that need to be addressed in service-level agreements (SLA) and legal contracts. Before we can deal with those problems, however, we have to select a supplier, which leads to more legal issues.

Before I specialized in security, my professional background was dark and mysterious. I used to be heavily involved in network provision to the academic community, and as part of this, I was once very senior in the world of domain-name services. This experience encouraged my naturally strong cynicism, as I could have domain-squatted on some now very high-value domains but instead kept the spirit of the early Internet and left them for others to profit from.

Years after leaving the academic world, I became a hard-nosed operations manager at a large retail Internet service provider. This experience has made me the Internet expert at several companies, including my current employer.

So not only am I reviewing the security of external providers as the security manager, but I'm also busy measuring them against our service requirements and helping in the design of the outsourced servers and network. Or I would be, if we and the service provider could agree on an appropriate nondisclosure agreement (NDA).

The providers won't tell us anything about their services unless a bit of paper is signed by both sides. This is ludicrous.

On their side, the suppliers are only telling us information that's freely available on their Web sites. I understand security and know the value of keeping quiet, but I also know that everyone gossips.

The financial services business is very incestuous — whatever the teams involved learn about one another will inevitably be discussed in bars and used on future projects. We all know this, yet, nonsensically, we all still demand the signed agreements.

I can only think that this requirement originated externally — do shareholders demand this sort of thing? Maybe the regulators investigate to ensure this kind of protection is in place. Or it could even be that this kind of documentation has become fashionable. Whatever the reason, if one side asks for it, you have to ask for one in return. It's part of the negotiation dance.

Unfortunately, we've managed to get into a tricky position. Our first project manager pulled some NDA agreements from somewhere and sent them to the suppliers. Then he left the company. Normally, that wouldn't delay a project, but he sent out the NDAs before getting them signed by our directors. When the NDAs came back with the suppliers' signatures, our legal team promptly rejected them, because they hadn't originated in the legal department.

So now we have a handful of annoyed vendors who, after signing the agreements we sent them, are wondering why we're now approaching them with a different set of documentation.

Financial services firms are under weird restrictions regarding their customer data, so we demand that everyone who receives our confidential information protect it forever. This is unreasonable, since I really don't think anyone is going to care what operating system we want for our Web servers.

Dances With Lawyers

Once we make it through the NDA minefield, we enter the twilight world of legal negotiations for the contracts and SLAs. A master of the field taught me a few tricks of commercial negotiations about which I feel confident, but the legal details just don't make sense.

On the commercial side, other than the list price nonsense, both sides seem to approach negotiations with good sense. One vendor's representatives quote a price, and we reach a consensus. We don't offend them by suggesting that we should get it for free, and they don't offend us by trying to rip us off. However, legal negotiations seem to begin with everyone doing their best to offend the opposing side.

The vendor wants to have our business but always proposes a laughable starting point. For example, it asks us to indemnify it from any losses for use of the service, while warranting nothing about the service. And then we respond with our opening position: We offer no indemnity and demand extreme and unrealistic warranties about the service. Starting with such unreasonable positions, it takes a long time to reach a mutual agreement.

Maybe the problem is that we bother to read and check these details; we regularly find typos and sections that just don't make sense because vendors have reversed the wording. Do they never correct their template, or are we the only people who check these things?

I realize that we all have to protect ourselves from unreasonable actions. I realize that the dance of legal negotiations has evolved into its current state, which works for the lawyers involved. But from a business perspective, assuming that everyone is going to be unreasonable while trying to behave unreasonably ourselves — and hoping we can get away with it — makes little sense. ●

THIS WEEK'S LINKS

www.sans.org/infosecFAQ/legal/legal_list.htm: Want to know which legal security issues might affect your organization? From HIPAA to the Gramm-Leach-Bliley Act, you'll find the details in the Bethesda, Md.-based SANS Institute's Information Security Reading Room.

http://supportnet.merit.edu/module3/legalresources.html: Look here for a useful collection of links about important legal security issues.

SECURITY BOOKSHELF:

Know Your Enemy, by Lance Spitzner, (Addison-Wesley, 2001) is an offshoot of the Honeynet Project (*http://project.honeynet.org*) and sets out to explain some of the knowledge the project leaders have gained from running a honeynet.

Like a honeypot, a honeynet tries to trick an attacker into wasting time and revealing his hand by attacking a fake system. But a honeynet does this on a much larger scale: It appears to be a whole company online, complete with Web, e-mail and domain-name servers.

Spitzner runs an excellent Web site, but the book is disappointing. The writing is stilted and highly repetitive. What's worse, the book takes a fascinating and enthralling project and trivializes it to a simplistic technical write-up and then pads it out with pages and pages of filler.

The project leaders obviously learned from many failures, but we never get to hear about them. Instead, we get the lessons learned in dry, technical prose. This book fails to capture their pioneering spirit and the risks they took to gather valuable knowledge. That's a pity, because both the technical knowledge and the personal experience of running the Honeynet Project are fascinating.

Quick Link For more on the Security Manager's Journal, including past journals, visit our Web site at www.computerworld.com/s/1g2000

● This week's journal is written by a real security manager, "Vince Tuesday," whose name and employer have been disguised for obvious reasons. Contact him at vince.tuesday@hushmail.com or go to the Security Manager's Journal forum.

ASP Brings Order to Temp Worker Chaos

White Amber eases contract labor procurement and management headaches

BY AMY HELEN JOHNSON

After an unsuccessful attempt in the fall of 1998 to outsource the management of its contract labor hiring, Xerox Corp. last year turned to an Internet-based service that standardizes the way the company requisitions, pays and evaluates its contingent workforce.

The Stamford, Conn.-based business supplies and services vendor decided to implement online procurement software built by Lake Success, N.Y.-based White Amber Inc. as an application service provider (ASP) service, says Aqua Porter, Xerox's manager in charge of labor procurement.

With the service, the company was able to improve its hiring processes and standardize job descriptions and the rates it paid for equivalent jobs in 3,000 local job markets. In addition, Porter says, the system gives hiring managers new analysis tools that enable them to calculate their spending and evaluate the performance of vendors and individual hires. Now, she says, "Xerox thinks we're paying the right price for the right people."

According to Larry Helft, White Amber's president and chief operating officer, the company's Internet-based ASP approach is a big benefit to IT organizations. White Amber places a minimal burden on IT because all the people involved in contingent staffing — at both the companies that supply labor and at customer sites — only need a browser to access the system.

Helft says IT gets most involved in setting up a workflow that allows the requisitions, hiring data and payment data to flow smoothly through the customer approval process and out to White Amber.

Christopher Boone, an analyst at Framingham, Mass.-based market researcher IDC, says White Amber brings several benefits to the table. For one, he says, it goes beyond being a pure application to provide a better methodology for managing contingent workers than most companies' current manual processes do. Second, White Amber is vendor-neutral — it doesn't supply contract labor itself — so a customer's existing suppliers aren't shut out of the system.

Porter says Xerox is indeed experiencing smoother processes for requisitioning and hiring contingent staff. Xerox's accounting department also benefits, she says, because White Amber consolidates a month's invoices for all labor suppliers into one bill that's delivered to the company via an existing electronic data interchange setup. (White Amber says it has no plans to integrate its hosted system with customers' back-end accounting systems.)

Although Xerox's procurement department initiated the search for an Internet-based staffing system, IT played an important role in choosing the winning vendor, says Porter. The department evaluated the impact on Xerox's network infrastructure, and IT expertise also was needed in investigating White Amber's security and disaster recovery plans, says Porter.

Xerox communications manager Carla Lorek says her IT department's evaluation strategy relied heavily on demonstrations of dummy transactions moving through the White Amber system, with four machines set up to simulate the different roles people at Xerox would assume when hiring and managing contingent staff.

The IT department also sped up a planned upgrade to Internet Explorer 5.0 for White Amber users so encryption and security requirements would be met.

Helft says the next step for White Amber is to globalize its ASP offering to accommodate the needs of its Global 1,000 target customers.

Porter, however, says she would also like to see improvements to the system's reporting features. Previously, Xerox's front-line managers never had in-depth analytics about labor suppliers and the contractors they used; any additional information of this type could be extremely valuable, she says.

Johnson is a Computerworld contributing writer in Seattle.

WHITE AMBER'S executives include (from left): Neil Toomb, Jim Zagelmeyer, Steve Vesce, Cary Dorsi and Ken Turano.

White Amber Inc.

2001 Marcus Ave., Suite N205
Lake Success, N.Y. 11042
(516) 777-3003

Web: *www.whiteamber.com*

Niche: This hosted application for finding, managing and paying contingent staff fills a void in human resources management.

Company officers:
- Steve Vesce, CEO and co-founder
- Larry Helft, president and chief operating officer
- Jim Zagelmeyer, co-founder

Milestones:
- March 2000: Company founded as VirtualEmploy.com; first version of service launched
- May 2000: Name changed to White Amber Inc.
- September 2000: Second round of venture capital funding
- May 2001: Version 3.0 of service debuts

Employees: 90

Burn money: $26.35 million from Venrock Associates, RRE Ventures and Infinity Capital Venture Fund

Services/pricing: White Amber Human Capital Management Solution charges firms a 2% commission on billable contract labor time.

Customers: Avis Rent A Car System Inc., Xerox, First Union Corp., Entergy Corp. and Wright Express LLC

Red flags for IT:
- Doesn't integrate with existing back-end human resources management systems.
- Requires certain browser versions for security and encryption to work correctly.

COMPUTERWORLD emerging companies

[the buzz] STATE OF THE MARKET

Labor Issues

So far, White Amber has cooperation from labor suppliers, says Christopher Boone, a senior analyst at IDC. But big companies like Manpower Inc. in Milwaukee and Kelly Services Inc. in Troy, Mich., may get stubborn about having a middleman between them and their customers, he says. If staffing companies see an advantage to owning the hiring and employee evaluation process, they could set up their own procurement services. White Amber may also face increasing competition from existing human resources software vendors.

Boone says the market for online labor procurement services in the U.S. is small but growing rapidly. Last year, revenues for services organizations (excluding software vendors) were approximately $80 million. Boone says he expects revenues to grow to $420 million by 2005.

The following are two of White Amber's competitors in the market:

PeopleSoft Inc.

Pleasanton, Calif.
www.peoplesoft.com

On May 31, PeopleSoft bought Skills Village Inc. and renamed it PeopleSoft Services Procurement. Boone says the acquisition proves that large human resources software vendors are beginning to understand that their customers need to manage their contingent workforces. PeopleSoft's offering has many features similar to those of White Amber, including the ability to work with existing labor suppliers, modules that handle payments to contingent staff, and reporting and analysis tools for understanding costs and performance.

eWork Exchange Inc.

San Francisco
www.ework.com

EWork's ProSource service parallels White Amber's, providing an online service for finding, qualifying, hiring and paying contingent staff. Many features are the same, such as consolidating all contractors' payments into a single customer invoice. Like White Amber, eWork partners with labor vendors. But the company also runs an online exchange through which independent contractors can offer services to eWork customers.

– *Amy Helen Johnson*

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Hardware Design Engineer wanted by optical networking system developer to Oceanport, NJ. Must have Bachelor's degree in Electronics Engineering, Computer Science or related field and 2 yr. exp. in job offered or in Hardware Engineering or Engineering. Respond to Doreen Connors, HR Department (refer 032), Tellium, Inc., 2 Crescent Place, Oceanport, NJ 07757

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Web Developer

Connecticut-based Internet marketing research supplier seeks to engage the services of a Web Developer.

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Requirements: Bachelor's Degree in Computer Science or equivalent plus 1 to 2 years of experience with website development and maintenance; active server technologies, relational databases and n-tiered architecture; Sun Certified Programmer and Java Platform.

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Senior Software Engineer (position located in Baltimore, MD) to perform senior level analysis, design, programming, debugging and modifying of local network or internet-related computer programs for customer-server or end user applications such as materials management, financial management, HRIS or desktop application products. Writes code and complete programming. Test and debug applications using current programming languages and technologies. Complete documentation and procedures for installations and maintenance. Interface with users to define system requirements and make modifications as necessary. Require: Master's degree in Computer Science, Engineering, Information Systems, or a closely related field with two years of experience in the job offered or as a Software/Applications Developer or Software Consultant. Experience gained before, during or after obtaining the Master's degree will be accepted. Salary: $68,000 per year. 8:00 am to 5:00 pm M-F. Send resume to: ICRM-HR, CheckFree Services Corporation, 6000 Perimeter Drive, Dublin, OH, e-mail to ltcareers@checkfree.com or fax to 614-364-3440, Attn: VS.

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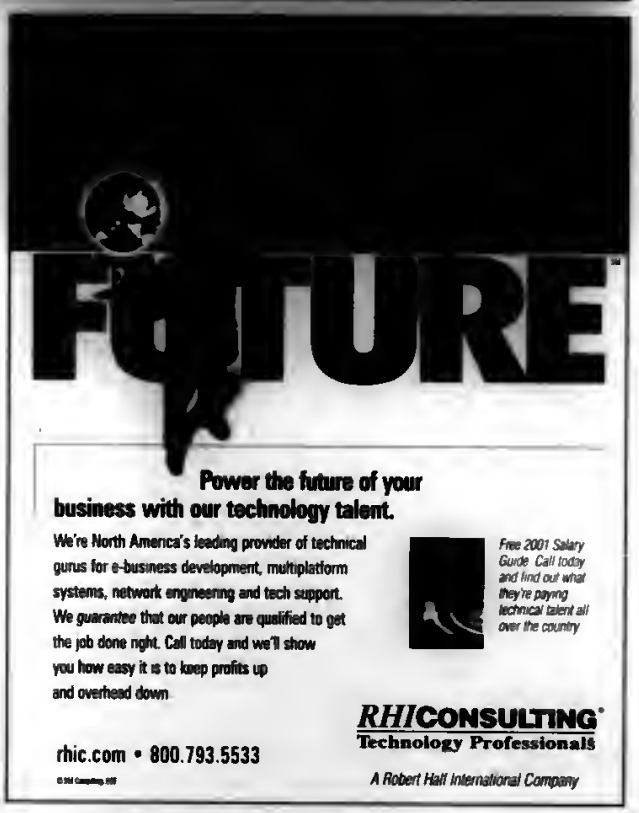
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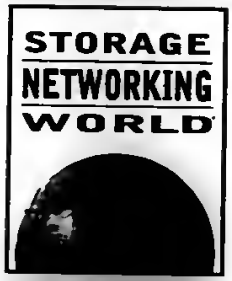

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Sabre

accomplished in three phases. The first phase, involving 192 CPUs, has already begun and should be complete and running by early next year, said Craig Murphy, Sabre's chief technology officer.

According to Murphy, the move will enable Sabre to double its developer productivity and reduce cost of ownership by 40%. He declined to say how much money that 40% represents, however.

Eventually, 16TB of Sabre's flight information will run on 4,000 processors and will be stored in relational databases with Sabre's proprietary fare-based search algorithm, Murphy said. It will be managed by Electronic Data Systems Corp., which will help Sabre make the move off the mainframe.

"[Sabre is] keeping control of the intellectual property," said Harteveldt. "They're really putting themselves at the heart of it, which is the brains. And they're letting EDS manage it and Compaq build it. It seems like a really smart move."

The most important aspect of the migration to the Himalaya servers is that seat availability won't hold up requests from the other databases on the system, Eastman said.

With the old mainframe, requests for information on seat availability had priority over requests for information on a departing flight, a meal or maintenance information. Add to that the millions of Internet users trying to book flights, and the result was enormous lags in network performance.

In July, Sabre and EDS finalized a 10-year, $2.2 billion agreement under which the Plano, Texas-based outsourcer will manage Sabre's IT operations. In addition, Sabre sold its legacy IT assets and outsourcing business for an estimated $778 million.

Meanwhile, airlines will have to decide whether to continue with their legacy reservation systems or upgrade to match Sabre's technology.

It will take a lot of work for the airlines served by Sabre to catch up with this advance, but when they do, Eastman said, "that's going to change the entire culture of the airline industry. The specifics of the technology are relatively incidental to . . . changing the way that the travel product will be distributed."

The goal, Murphy said, is "the real-time integration of Sabre data into a single database in a single location." That will also allow Sabre, with cooperation from the airlines, to build business logic into the reservation systems. Such business logic could automatically release seats at a lower price if the airline hasn't sold enough by a preset date — a practice known as availability caching.

The relational databases could also allow the airlines to sell some seats to third parties and divest themselves of some of the risk if seats aren't sold. For example, an online travel site such as Orbitz LLC or Expedia Inc. could "own" a set number of seats on an aircraft, for all its flights.

The technical migration, as massive as it is, won't be nearly as difficult as convincing airline managers of the business benefits of sharing maintenance, accounting and reservation information in one system, since those departments lose some independence in the process, Eastman said.

Attempts to obtain comments from the airlines were unsuccessful by press time.

Sabre's move is part of an ongoing airline industry shift away from the mainframe.

Delta Air Lines Inc. in Atlanta signed a deal last September to run its pricing and reservations operations on a farm of Hewlett-Packard Unix servers with software from ITA Software Inc. in Cambridge, Mass. ITA also supplied the booking engine for Chicago-based Orbitz.

In July, Quebec-based Air Canada announced that with IBM's help, it plans to move to an all-IP network. ▶

Sabre Turns to Its Neighbor, Compaq

After four decades with IBM, Sabre has abandoned Big Blue for Texas neighbor Compaq.

IBM helped build the transaction processing facility (TPF) for American Airlines Inc. in the late 1950s and early 1960s that would become the Sabre global distribution system (GDS). IBM built a similar TPF system for Chicago-based United Air Lines Inc. That system later became the Apollo GDS.

So why didn't Sabre turn to IBM when it was time to update its infrastructure? Craig Murphy, CTO at Sabre, said that Compaq's plug-and-play capability and standard development kits were main reasons for choosing the Houston computer manufacturer.

Compaq, for its part, boasted that it has done this sort of thing before.

"We run the top 15 stock exchanges today," said Howard Elias, Compaq senior vice president and general manager of the Business Critical Solutions Group. "These systems just do not go down."

That Compaq and Sabre are neighbors probably didn't hurt either, said Richard Eastman, president of The Eastman Group Inc. in Newport Beach, Calif. But there are other considerations as well.

"IBM has a culture that would be threatened by what Sabre is trying to do now. IBM's airline people are all legacy mainframe guys. IBM's network guys don't have [business contacts] at Sabre, Eastman said. "Right now Compaq needs the business, and I betcha if their technology is essentially equal, pricing played a role."

– Jennifer DiSabatino

Privacy Choice 'Best Practice'

BY PATRICK THIBODEAU
WASHINGTON

A privacy watchdog group released a report last week that cited best and worst practices among financial institutions for protecting online privacy.

Among the best practices cited in the study by The Center for Democracy & Technology in Washington are those used by First Union Corp. in Charlotte, N.C., which offered its Web customers an online form for opting out of marketing deals and for limiting the sharing of personal data.

The report criticized Community First Bankshares Inc. in Fargo, N.D., which requires online banking customers who want to get off of its marketing lists to phone to receive a form that has to be returned by mail.

Privacy advocates said the latter practice would likely frustrate consumers. But Community First is hardly alone: Only 22% of the 100 companies surveyed offer a "convenient online means" of preventing data sharing, the report said.

"We have systems that are robust and strong enough to do important things like move money, but not apparently robust enough to allow privacy choice," said Peter Swire, former chief privacy counselor for the Clinton administration and a visiting law professor at The George Washington University.

But Pat Staples, senior vice president of market development at Community First, said that asking customers to speak with customer service helps the bank understand a customer's particular privacy concerns.

"Privacy at this stage is definitely a competitive differentiator" in financial services, said Dennis Behrman, an analyst at Meridien Research Inc. in Newton, Mass. ▶

From 6-bit Systems to the Internet

A time line of airline global distribution systems

▶ **LATE 1950s** Airlines collectively ask IBM to build an automated inventory system.

▶ **EARLY 1960s** American Airlines splits from the group and develops its own IBM-based, 6-bit system, called a transaction process facility (TPF), which would eventually become Sabre. United follows suit with a similar TPF computer reservations system named Apollo (later called a global distribution system).

▶ **MID 1960s** Airlines run data lines to travel agencies. Central system polls dumb terminals for reservation requests. They soon discover it is faster to run the information between data centers than it is to run all lines to the travel agent, and the global distribution systems are born. They then establish an airline-owned company called ARINC to run the network. Transmission speed is typically 300 bit/sec., 1,600 bit/sec. on a dedicated line.

▶ **1970s-1980s** Airlines build corporate systems infrastructure on top of TPFs. All accounting, management, catering, governmental regulations and operational data is sent through a system that can't accept uppercase letters.

▶ **1999** The top five airlines create Orbitz, an online travel site. American Airlines pulls out of Sabre.

▶ **2001** Delta Air Lines decides to move off the mainframe. Orbitz officially launches. Air Canada, with IBM, decides to move to an all-IP network. Sabre announces it will move off of the mainframe as well, using server from fellow Texas company Compaq Computer Corp.

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FRANK HAYES/FRANKLY SPEAKING

'Laws' to Work By

SEVEN LAWS. No court in the world will lock you up for breaking any of them. But for corporate IT people, they're crucial — not just because of what they mean, but because of what users, managers and executives *think* they mean. That gap is what will *really* get you in trouble.

Parkinson's Law: "Work expands so as to fill the time available for its completion."
Who said it: Historian C. Northcote Parkinson, in a 1955 article in *The Economist*.
What it means: We can stretch any work to last as long as necessary.
What too many people think it means: We can compress any project into a shrinking schedule.
Why the difference matters: We can't squeeze into impossible schedules, no matter how loudly the executives scream.

Moore's Law: "Transistor density on a manufactured semiconductor die doubles about every 18 months."
Who said it: Intel founder Gordon Moore, in a 1965 article for *Electronics* magazine. (Moore originally said density doubles every year.)
What it means: Chip makers keep getting better at cramming transistors onto chips.
What too many people think it means: Computers double their ability to get work done every 18 months.
Why the difference matters: Transistor density doesn't equal computer power. And even if it did, computer power doesn't equal the ability to get work done.

Brooks' Law: "Adding manpower to a late software project makes it later."
Who said it: Frederick P. Brooks Jr., in his 1975 book *The Mythical Man-Month*.
What it means: Getting new team members up to speed delays development even more than just finishing the job with the existing team.
What too many people think it means: A crazy idea. If throwing more people at the problem doesn't help, how could it hurt?
Why the difference matters: Developing systems isn't like picking sweet corn. Until we all understand that, we'll keep wasting the time and people we throw at projects that slip their schedules.

Murphy's Law: "If there is any way to do it wrong, someone will."
Who said it: Air Force Capt. Edward A. Murphy, 1949.
What it means: Unless you bulletproof a procedure or system, things go wrong.
What too many people think it means: Things will always go wrong.
Why the difference matters: Failure isn't inevitable — unless we assume it is.

Hoare's Law (of Large Problems): "Inside every large problem is a small problem struggling to get out."
Who said it: Oxford professor C.A.R. Hoare, in a 1984 article for the journal *The Pentagon*.
What it means: Big problems are really made up of smaller problems.
What too many people think it means: Big problems are really small problems.
Why it matters: Finding a small problem at the center of a larger problem isn't enough to solve the larger problem — it's only a start. If you mistake the little solution for the big solution, you'll end up testing Brooks' Law.

Metcalfe's Law: "The value of a network grows as the square of the number of its users."
Who said it: Ethernet inventor Robert Metcalfe.
What it means: The more users who can communicate with one another on a network, the more useful it is.
What too many people think it means: The more users who are on the Internet, the more profitable it is.
Why the difference matters: Just ask any dot-com that's now a flaming wreck on the information superhighway.

Weinberg's Law: "If builders built buildings the way programmers wrote programs, then the first woodpecker that came along would destroy civilization."
Who said it: Software engineering guru Gerald M. Weinberg.
What it means: It is possible to build better software.
What too many people think it means: All programmers are incompetent, and all software is junk.
Why the difference matters: Never mind professional pride — if users really believe software is junk, why should they keep paying for their own expensive software developers? They can get junk anywhere.

Frank Hayes, Computerworld's senior news columnist, has covered IT for more than 20 years. Contact him at frank_hayes@computerworld.com.

SHARK TANK

ARE ALL COMPUTERS made in Boise? user asks IT pilot fish. Why? "Well," says user, "every time I turn on a computer, it starts up with a message from Boise. But they keep spelling it wrong: B-I-O-S. Why is that?"

POTENTIAL USER of an Internet database can't seem to access the service. Support pilot fish checks it out but with no success, so he reinstalls the access software. During the reinstallation, user has a flash of insight: "I don't have Internet access yet. Could that be part of the problem?"

PILOT FISH SENDS out a warning to users: "Our ISP has routing problems in its backbone. You may find that some Internet destinations work while others don't. I'll keep you posted as I get more information." Fish's CEO fires back a query. "How will we know which ones work and which ones don't?"

VENEZUELAN pilot fish building a data center doesn't have grounded electrical power, so he straps ground lines to metal water pipes. "But," asks his boss, "what's going to happen if we run out of water?"

"WE POURED all the water out of the computer, but it's still not working," user tells help desk pilot fish. "Could you send someone over to look at it?"

SECRETARY CALLS IT pilot fish in a frenzy. Her new boss starts in two days – how soon can we get him set up? "Does he have a computer in his office?" fish asks. "No," says secretary "it's on order. Does that matter?"

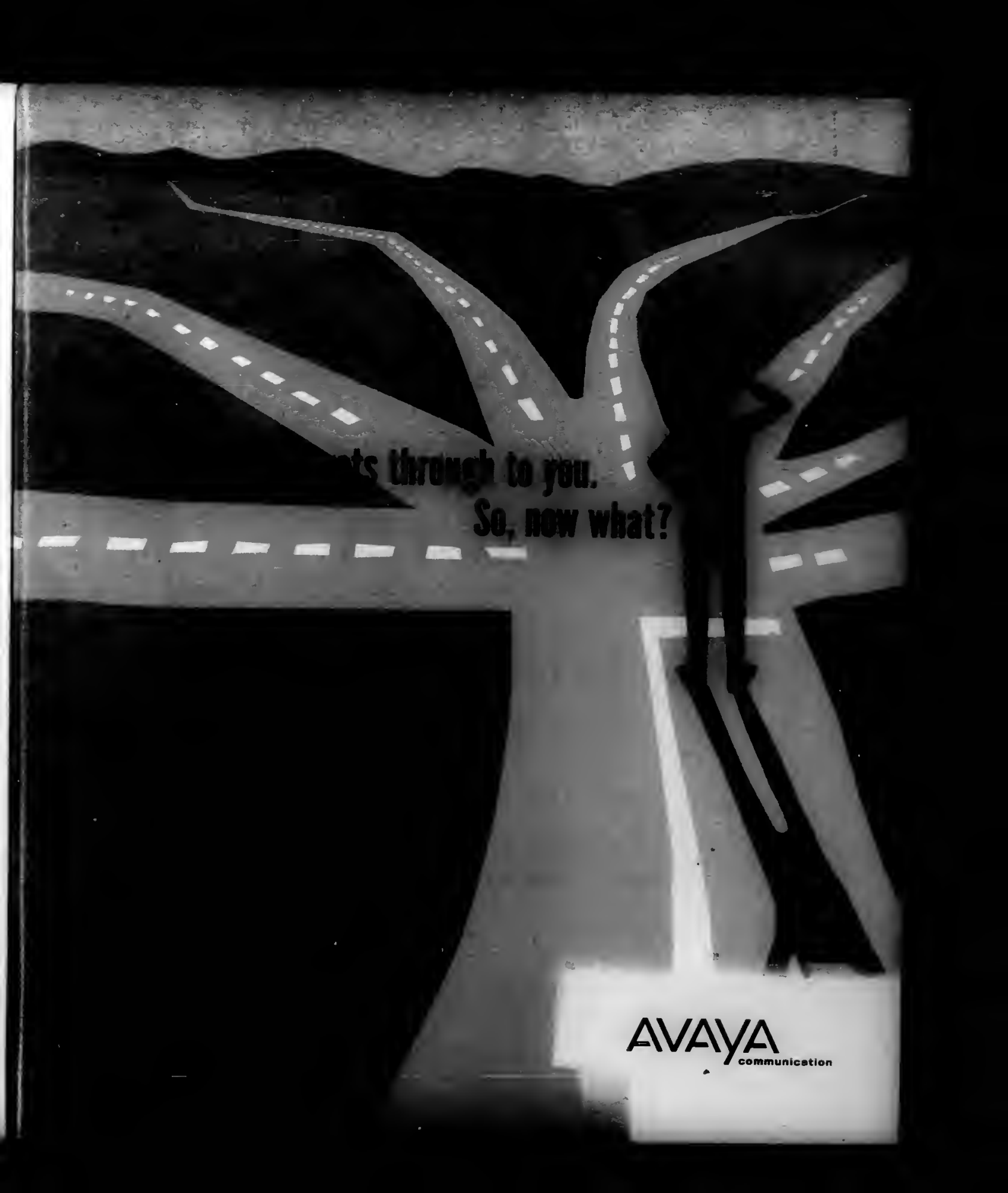
WATCHING PILOT FISH troubleshoot a Windows 2000 PC that hangs on start-up, user suggests, "Can you lubricate the hard drive to unstuck it?"

Sharky's favorite question of the week: "If there's smoke coming out of the back of the terminal, does that mean the system is down?" Tell me yours: **sharky@computerworld.com**. You get a snappy Shark shirt if your true tale of IT life sees print – or if it shows up in the daily feed at *computerworld.com/sharky*.

The 5th Wave

©Rich Tennant, www.the5thwave.com

"It's okay. One of the routers must have gone down and we had a brief broadcast storm."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